VOL. LXXXII APRIL, 1933 N.S. VOL. 35, NO. 4

JOURNAL
of the
American Veterinary Medical Association

EDITED AND PUBLISHED FOR
The American Veterinary Medical Association

CONTENTS

Editorials 541
Applications for Membership 545
Coming Veterinary Meetings 546
Papers:
Reminiscences of the World War—L. A. Merillat 547
Bulla-Osteotomy in the Cat—J. E. McCoy and G. W. McNutt 557
Observations on the Use of Pigeon-Pox Virus as a Cutaneous Vaccine for Fowl-Pox in an Egg-Laying Contest—F. H. Orr, Jr., and M. W. Emmel 562
A Detailed Study of No-Lesion, Tuberculin-Reacting Cattle—E. G. Hastings, Walter Wisnicky, B. A. Beach and Janet McCarter 565
The Serological Identity of Strains of Erysipelothrix Rhusiopathiae of Ovine and Porcine Origin—Hadleigh Marsh 584
A Biological and Bacteriological Study of Bovine Mastitis—J. M. Rosell and W. T. Miller 587
Equine Encephalomyelitis Antiserum—Edward Records and Lyman R. Vawter 608
Henry Johnson Detmers—Fritz Volkmar 617
Clinical and Case Reports:
Transmission of Experimental Rabies from Mother to Young—J. E. Schneider and B. J. McGroarty 627
Canine Coccidiosis Due to Eimeria Canis—L. V. Skidmore and C. B. McGrath 627
A Method of Preserving Actinomyces Bovis in Its "Ray Fungus" Form—I. A. Merchant 630
The Defense Mechanism in a Case of Traumatic Pericarditis in a Cow—J. F. Witter 631
Reviews 636
Publications Received 637
Abstracts 638
Army Veterinary Service 644
Miscellaneous 645
Communication 649
American Veterinary Medical Association:
Financial Report, M. Jacob, Treasurer, December 31, 1932 650
Organization for 1932-1933 (Concluded) 651
Association Meetings 653
Necrology 668
Personals 681

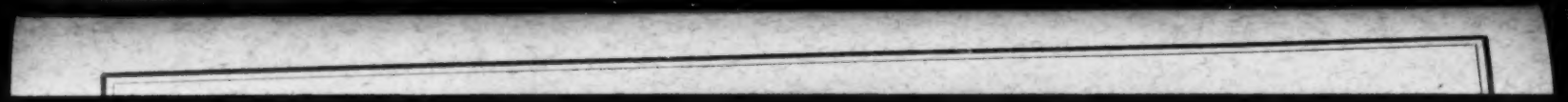
$4.00 per annum Foreign $5.00; Canada $4.50 Single Copies 40 cts. in U. S.

Published monthly at 1230 W. Washington Blvd., Chicago, Ill. Entered as Second Class Matter, August 10, 1932, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of February 28, 1925, authorized August 10, 1932.

IN all history, when learning shed light on the imperfections of mundane thought, the wrath of Moloch was aroused. Wise men revealed truths at the risk of life and liberty. Socrates was executed, Galileo jailed, and Hugo banished. Mercenaries burned the libraries to curb the onslaught of popular education. Today, the teachings of Koch and Dorset are scouted by the same influence.

IN all time, materialism has fought the altruistic groups with arms and arguments that crumbled before the power of right, moral integrity and clean thinking, leaving the wreck of progressive civilization in its path as evidence of its futile assault.

THE CORN STATES SERUM CO.
OMAHA, NEBRASKA



JOURNAL
of the
American Veterinary Medical Association
Formerly AMERICAN VETERINARY REVIEW
(Original Official Organ U. S. Vet. Med. Assn.)
H. Preston Hoskins, Secretary-Editor, 1230 W. Washington Blvd., Chicago, Ill.

N. F. WILLIAMS, Pres., Fort Worth, Tex. M. JACOB, Treas., Knoxville, Tenn.
EXECUTIVE BOARD
R. S. MACKELLAR, Member-at-Large and Chairman;
N. F. WILLIAMS, ex officio; R. R. DYKSTRA, ex officio;
A. E. CAMERON, 1st District; E. P. ALTHOUSE, 2nd District; L. A. MERILLAT, 3rd District;
C. A. CARY, 4th District; C. P. FITCH, 5th District; L. M. HURT, 6th District;
C. H. HAYS, 7th District; J. C. FLYNN, 8th District; H. W. JAKEMAN, 9th District; O. V. BRUMLEY, 10th District.

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions. Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXXXII, N. S. Vol. 35 APRIL, 1933 No. 4

CONVENTION CLINICS

Can you picture an A. V. M. A. clinic being held in Chicago, at the corner of State and Monroe Streets? Well, that is just exactly what is being planned for Friday, August 18, 1933. But the clinic is not expected to hold up traffic at this busy corner, one of the busiest in the world, as a matter of fact. The throngs passing this well-known intersection will not be aware of what is going on, almost above their heads, unless they read about it in the papers. This is because the clinic will be held on the fourth floor of the Palmer House. Here the exhibition hall, which has a floor area of 20,000 square feet, will be the scene of what promises to be the best clinic in the history of the A. V. M. A., which is saying a lot. Dr. L. A. Merillat will be in charge and it hardly should be necessary to say anything more.

There have been all kinds of clinics in times past. These have been held under all sorts of conditions, from very bad to very good. Clinics have been held in tents, private veterinary hospitals, veterinary colleges, armories, stockyards, pavilions at fair grounds, or wherever space was available. On several occasions the clinics have been so poorly conducted, or the facilities have been so inadequate, that suggestions have been made for eliminating surgical clinics from A. V. M. A. convention programs. We do not have to go back very far in A. V. M. A. history to find conventions at which no clinics were held.

On the other hand, there have been a number of clinics during recent years that have established high standards of excellence. The modern A. V. M. A. convention clinic is not the place for the performance of everyday surgical operations. The time is long past when a clinic held in conjunction with a convention of our national organization should feature such commonplace operations as spaying a bitch or firing a spavin. New methods of diagnosis, new operations, improved technic for old operations, or demonstrations of real didactic value deserve places on clinic programs. Operations should not be attempted unless the proper facilities are provided, including anesthesia, restraint, instruments and dressings. Anything less is unfair to the operator, the patient and the audience.

One of the most famous clinics in A. V. M. A. history is the one held in Atlantic City in 1901, in a tent on a lot in back of the Hotel Rudolf, official headquarters for the convention. This particular clinic derives its fame from the fact that a cow appeared for the first time at an A. V. M. A. clinic. Some of our older members will recall the demonstration, given by Dr. J. C. Michener, of Pennsylvania, of casting a cow for handling various forms of dystokia. It is recorded that the wife of a veterinarian demonstrated her skill in administering an aloetic bolus to a horse at the clinic held in conjunction with the 1904 convention in Saint Louis. It was in the same city, eighteen years later, that sectional clinics were inaugurated, and the first clinic for small animals, worthy of the name, was a feature of this memorable meeting. It was held in the basement of the Planters Hotel, under the direction of Dr. J. C. Flynn. It was at Portland, Ore., in 1925, that anything in the shape of a poultry clinic was attempted for the first time.

Nowadays, a properly appointed clinic is expected at an A. V. M. A. convention. It has come to be just as much a part of the program as the business sessions or the sectional meetings. The important consideration at present is to maintain A. V. M. A. clinics on a high plane of excellence.

EXECUTIVE BOARD ELECTIONS

The Executive Board primary elections now being held in District 2 (Pennsylvania, New Jersey and Delaware) and in District 3 (Indiana, Illinois and Wisconsin) will come to a close April 14. On the following day, if all goes well, ballots for the

elections proper will be mailed to all members in good standing in the two districts. Polls will remain open for the period of 60 days provided by the By-laws, namely, until June 14.

Unofficial ballots have been circulated in District 3, resulting in some confusion among the members in the District and making necessary quite a little letter-writing in the Secretary's office. The unfortunate part of this affair lies in the fact that ballots appear to have been placed in the hands of a number who were not qualified to vote. Undoubtedly this has been done with only the best of intentions, but on account of the confusion which invariably results, it is suggested that members who are interested in the candidacy of any member should refrain from circulating anything in the form of a ballot. Every member eligible to vote in the two districts has been sent an official ballot by first-class mail.

NEVADA JOINS THE LIST

On March 1, Nevada was added to the list of states designated by the U. S. Department of Agriculture as a modified accredited area. The Silver State was the ninth to go on the honor roll, which now reads as follows:

Maine	Indiana	Idaho
North Carolina	Wisconsin	North Dakota
Michigan	Ohio	Nevada

According to Dr. A. E. Wight, who has directed the campaign from Washington, practically all of the tuberculosis eradication work has been done under range and semi-range conditions. Although the State as a whole had relatively little bovine tuberculosis, the disease had become established in certain localities and these had to be cleaned up just the same as if they had been in a badly infected state.

Elko and Eureka counties were the last to meet the requirements for accreditation. The enormity of the task may be appreciated when it is realized that Elko County is almost as large as the states of Maryland, Delaware and New Jersey combined.

Dr. Edward Records, secretary and executive officer of the State Board of Stock Commissioners, and Dr. L. C. Butterfield, in charge of U. S. B. A. I. activities in Nevada, join in giving a large part of the credit for completing the work to the cattle-owners in Nevada who coöperated to the fullest extent all through the campaign.

PRESENTING TWO WELL-KNOWN AMERICANS

Most readers of the JOURNAL will recognize the two distinguished gentlemen shown in the accompanying photograph, taken at Warm Springs, Ga. When? Well, according to the note which came with the photograph, the exact date was May 7, 1932. Many things have happened since then. Dr. M. Jacob (wearing

TWO WELL-KNOWN AMERICANS

the badge) was reëlected treasurer of the American Veterinary Medical Association, August 24, 1932, and entered upon his fifteenth term on January 1, 1933. Hon. Franklin Delano Roosevelt (looking up) was elected thirty-first president of the United States on November 8, 1932, and entered upon his duties March

4, 1933. The JOURNAL is unable to say whether finances or farm relief was being discussed when the picture was taken, but it is quite evident that Mr. Roosevelt and Dr. Jacob were in accord.

TWO MORE STATES IN LINE

Dr. C. C. Palmer, of Newark, Del., calls our attention to the fact that the Delaware Veterinary Medical Association approved the plan for affiliation, at the 1932 summer meeting. Through an oversight, Delaware was not included in the list of states approving the plan, published in the February issue of the JOURNAL. The Nevada State Veterinary Medical Association, on January 31, 1933, rescinded its previous action and approved the plan for affiliation. Nevada was the thirty-fourth state to take favorable action.

APPLICATIONS FOR MEMBERSHIP

(See January, 1933, JOURNAL)

FIRST LISTING

BAKER, JOHN M. Saint Walburg, Saskatchewan
B. V. Sc., Ontario Veterinary College, 1932
Vouchers: John N. Campbell and M. Barker.

CRABB, LEWIS C. 1700 Evans Ave., Fort Worth, Texas
D. V. S., Kansas City Veterinary College, 1911
Vouchers: Frank D. Porter and J. J. Reid.

HODGSON, MELVIN E. R. 1, Box 149, Hutchinson, Kan.
D. V. M., Kansas State College, 1932
Vouchers: E. E. Leasure and Joseph P. Scott.

LEVY, MILTON C. Apt. 2, 1173 Hayes St., San Francisco, Calif.
B. S., D. V. M., Washington State College, 1931
Vouchers: John McInnes and Joseph M. Arburua.

STILES, SIDNEY W. Falmouth Foreside, Me.
V. M. D., University of Pennsylvania, 1932
Vouchers: M. E. Maddocks and Henry B. Wescott.

WILLERS, ERNEST H. Puunene Club, Puunene, Maui, Hawaii
B. S., D. V. M., Washington State College, 1929
Vouchers: Robert H. Morrison and J. C. Fitzgerald.

Applications Pending

SECOND LISTING

(See March, 1933, JOURNAL)

Cravens, Marion L., 5547 S. California Ave., Chicago, Ill.
Hillman, John W., 20 Quincy St., North Adams, Mass.
Pals, Clarence H., 6401 University Ave., Chicago, Ill.

The amount which should accompany an application filed this month is $8.75, which covers membership fee and dues to January 1, 1934, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. April 5, 1933. Dr. John E. Crawford, Secretary, 708 Beach 19th St., Far Rockaway, Long Island, N. Y.

San Diego-Imperial Veterinary Medical Association. San Diego, Calif. April 5, 1933. Dr. A. P. Immenschuh, Secretary, Santee, Calif.

Southwestern Minnesota Veterinary Medical Association. New Ulm, Minn. April 6, 1933. Dr. E. R. Tillisch, Secretary, Westbrook, Minn.

Interstate Veterinary Medical Association. Elks Bldg., Omaha, Neb. April 10, 1933. Dr. G. L. Taylor, Secretary, Plattsmouth, Neb.

Chicago Veterinary Medical Association. Hotel LaSalle, Chicago, Ill. April 11, 1933. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.

Maine Veterinary Medical Association. State House, Augusta, Me. April 12, 1933. Dr. L. E. Maddocks, Secretary, R. F. D. 2, Augusta, Me.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. April 12, 1933. Dr. A. S. Schlingman, Secretary, Parke, Davis & Co., Detroit, Mich.

Tulsa County Veterinary Association. Tulsa, Okla. April 13, 1933. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. April 18, 1933. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

Southern California Veterinary Medical Association. Joint meeting with Hollywood Academy of Medicine. Roosevelt Hotel, Los Angeles, Calif. April 20, 1933. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.

Keystone Veterinary Medical Association. Philadelphia, Pa. April 26, 1933. Dr. C. S. Rockwell, Secretary, 5225 Spruce St., Philadelphia, Pa.

Connecticut Veterinary Medical Association. Hotel Arrigoni, Middletown, Conn. May 3, 1933. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.

Hudson Valley Veterinary Medical Society. Catskill, N. Y. May 10, 1933. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

REMINISCENCES OF THE WORLD WAR*

By L. A. MERILLAT, *Chicago, Ill.*

ON THE WAY TO FRANCE

Fifteen years ago, when the American Veterinary Medical Association was holding its annual convention in Kansas City (1917), the veterinary profession was agog from a call to arms. A few veterinary officers had been commissioned in the lower ranks, from civil life, to augment the newly commissioned personnel from the Regular Army. A few of these already were in France. Colonel Wm. P. Hill, then a major in the veterinary service, was attached as an observer to the British Army, studying the operations of its Veterinary Corps on the Western Front. The Quartermaster Department was purchasing animals on a large scale, judging from the uniformed remount officers mobilized at the large horse markets.

Two weeks later, the Secretary of War authorized the appointment of seven additional majors for the emergency. It came to pass that the writer became one of the seven. Cotton, Blattenberg, Klein, Marshall, Staley and White were the six others.

On October 3, or five weeks after the meeting, I was on my way to France for a term of service that lasted approximately two years, during which my professional life was interpolated with experiences of considerable interest.

FIRST AMERICAN VETERINARY HOSPITAL ORGANIZED

It is self-evident, therefore, that I am qualified to relate facts concerning the oversea service only. The experience of organizing the first American veterinary hospital to serve our troops in training during the cold winter of 1917-1918, where no veterinary service whatsoever had been instituted to prevent the spread of contagious diseases or administer to the ordinary needs of military animals agglommerated for action; the inspection of nearly all of the horsed units scattered practically all over the seaboard and interior regions of France during the summer of 1918, when the remount service, because of poor horsemanship, had permitted an unusual percentage of morbidity and mortality to develop; the opportunity of serving as chief veterinarian of all the American troops in action, during the

*Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

two major operations, when the combat forces had grown to a million men; and finally the practical demonstration that contagious diseases can be kept under control, carried out during the winter season of 1918-1919 following the armistice, was a combination of exceptional opportunities for trying out the value of a veterinary corps.

During the winter of 1917-1918, while our troops were oriented around Neufchateau (Vosges), and before they had fired a cannon at the enemy, the condition of our animals was no credit to the American people and a disgrace to their veterinary profession. It was branding the A. E. F. as an untrained mob, capable of doing more harm than good to the cause of the allies on the Western Front. Open expressions and complaints to that effect were not lacking. By contrast, during the winter of 1918-1919, with approximately the same number of animals, in troops located for training in approximately the same territory, notwithstanding that the animals had just come through four months of hard fighting along the Meuse and in the Argonne, the animals were kept in splendid condition and the incidence of disease kept low.

I need only remind those on the ground that the animals of the First Army, after the hostilities had ceased, were kept in such a wonderful state of health and physical condition that the commanders of the corps and divisions held inter-corps and inter-divisional horse shows to display the excellence of their animals. The horse shows held among the divisional and corps units of the First Army, training in the region around Bar-sur-Aube, during December, January and February, 1918-1919, may in all future times be pointed out as a practical demonstration of the difference between an armed force with, and one without, a veterinary corps in perfect operation, since before the battles we had no veterinary corps in France. The corps was born and developed during the days of hard and difficult action in the Meuse-Argonne battlefields. So, in having self-adjudicated my service from the professional rather than from the military standpoints, this reminiscence stands first on the scale of importance.

General Staff Fails to Cooperate

Between the winter of 1917-1918 and that of 1918-1919, a veterinary corps was born to the United States Army. When the United States declared war against the Central Powers, only a year had elapsed since army veterinarians were commissioned as officers; and inasmuch as their numbers were few,

there were many officers in the various branches of the service who knew them only as "uncommissioned" attachés of the cavalry or artillery regiments. As a consequence, we lacked influence in France. Moreover, it is incontrovertible that a major in the veterinary service was appraised below the par of his rank. To the officers in the Regular Army we were classified as personnel tacked on to treat a sick horse or a sick mule.

Commanding enlisted men or administrative work was foreign to the duties of a veterinary officer. Evidence of this was cumulative in the A. E. F. The chief quartermaster of the Advance Section of the Service of Supply went to considerable trouble to remind me of this when I reported at Neufchateau to take over the work of organizing the veterinary hospital at that place. Although my orders read that I was to be "in charge of the veterinary hospital," he went on to explain that I was not to have charge of anything. Asked how one was to train soldiers for a highly technical duty without authority to command them, he closed the interview with a snarling retort that my job was to obey orders and the regulations. Inasmuch as there were no regulations that I could discover governing the behavior of a veterinary officer about to organize a veterinary hospital, I assumed that this martinet thought it prudent to make me shut up before he got himself into deep water. So, those veterinary officers who went to France with the first expeditions had the difficult task of breaking through that old tradition about army veterinarians as well as to organize a veterinary service for an army in action, 3,000 miles from home, with nothing more than the discounted rank of "Major, V. C.," as the point of departure, and among old general and field officers, who would lose a war rather than to use common sense and cut corners that violated the Bible they called Army Regulations.

Men like Major Louis A. Klein, sent to France by the Surgeon General at Washington to establish a harmonious relationship between the home and the oversea forces, will testify to the studied determination of the general staff of the A. E. F. to discount all outside advice or interference with its plans to handle the animal situation, which were practically no plans at all.

So, my third reminiscence is the recollection that members of the general staff (A. E. F.), while openly boasting of the high quality of their administrative work, were violating the first law of administration, namely, coöperation. The general staff of the A. E. F. wilfully precipitated a quarrel with the general

staff at home, which seemed to have continued up to the then present day. In the case of the veterinary service, officers of the mounted service seemed to feel obligated to violate an act of Congress by transferring the veterinary service from the Medical Department to the Quartermaster Department. The Surgeon General, A. E. F., was directed to keep hands off the veterinary service. But the advocates of this project, evidently finding themselves slipping into pretty deep water, allowed the Surgeon General to supply personnel and medical supplies. As these early heroes seemed to know absolutely nothing about the handling of animal diseases, nothing about the training of men for that purpose, and still less about medical supplies, they complicated the veterinary service into a state of abject impotence. As all experts foresaw, their plan did not work. A four-leaf pamphlet was pronounced a competent and sufficient regulation for the handling of both the remount and veterinary services until it took the American troops into the animal catastrophe on the Marne, in July, 1918. In August, the animal disease situation having become a veritable disgrace, an unsolvable medical problem, our service was cheerfully handed back to the Medical Department. Taking the veterinary service out of the command of the Surgeon General was a gigantic blunder as events have proved. It, therefore, stands out in red letters among one's reminiscences.

Fifty Per Cent Shortage of Animals

It is not generally known that the animals of the American Expeditionary Forces came from France and Spain. There were but few animals obtained from the United States. They were obtained from the French Army, from the French farmers, and many of them were brought across the Spanish frontier at Bayonne, or shipped to French seaports from Spain. These animals were issued to troops in training in the interior or collected at remount depots. The inspection of these troops and depots, made during the summer of 1918, showed that nothing worthwhile had been done to prevent contagious diseases, nor even to supply ordinary care for them. It was not until Under-Secretary of State for the President of the French Republic drew attention to the fact that our animals were becoming a menace to the agricultural industry as well as to the troops on the Western Front, that the A. E. F. woke up to the fact that its anti-scientific program was dynamite, not only to our own country but to others as well. Having served as the executive officer

of the international board appointed to investigate the condition of the American animals, I had an opportunity to observe the operations of an army attempting to function without a veterinary corps. The incidence of disease from exposure, lack of care, and infections ran so high that the First Army was compelled to go into action in the fall with a 50 per cent shortage of animals. We bought plenty of animals at big prices but they not only died in large numbers and remained disabled too long to be worth anything to the troops, but, besides, they required a large personnel to attend them who might have been released for the troops at the front. The unfortunate animals that fell into the hands of the remount service in the interior of France and with troops in training inscribed an ugly picture of our poor horsemanship.

A Discredited Veterinary Service

On August 5, 1918, I was relieved from duty with the international board and was directed to proceed to the newly formed First Army, in the capacity of chief veterinarian of that unit. The troops were moving from the Marne around Chateau Thierry back to the Lorraine sector around Neufchateau to prepare for an offensive under American command. The First Army Corps, operating under a French Army commander, had gone into action on the Marne in July without a veterinary service. As no provision had been made for the disposal of disabled animals, this splendid, fighting organization of six or more American divisions left a bad impression among the allied troops through having displayed incompetence in handling its animal transport service. Not having established a working connection with the veterinary corps of the French Army under which it fought, no systematic evacuation of animals was carried out.

Some of the more resourceful division veterinarians sent disabled animals to French veterinary hospitals, while others just abandoned them along the highways or attempted to hospitalize them with the mobile veterinary section. The result of this omission, having been described in detail in recent articles, will not be repeated here. Suffice to say that the Marne débacle drew the attention of General Payot, commander of the group of armies of the east and north, who wrote a letter to the general staff pointing out the necessity of disposing of disabled animals. While serving on the international liaison mission we had frequently received letters calling our attention to the pernicious habit of the American troops in abandoning animals in the small

villages and highways which the town mayors were constantly reporting to the military authorities. Letters of this kind were very disconcerting, as they implied that we were just a cohort of wild west semi-savages who lacked knowledge of the most fundamental principles of modern warfare. The fault of all this I have taken pains to trace to a particular officer on the general staff who would listen to no arguments on the handling of our disgraceful horsemanship.

The lack of personnel cannot be invoked in explanation of the Marne catastrophe because the newly appointed chief remount officer of the First Army, working with me as the chief veterinarian, arriving upon the scene empty handed, manned and equipped a veterinary hospital at Claye Souilly in a few days, and within a week evacuated 1,100 of these stray animals to it. It cannot be argued that the same arrangement could not have been made as easily before the Marne operation as after. The reason it was not done before the battle was because the general staff, arrogant in its attitude toward organizing a veterinary service, had not even tried to supply one. The same personnel and the same accommodations used by us on August 5 were available on July 15, when the battle opened. The general staff did not issue competent regulations on the handling of animals. It allowed our troops to go into action with nothing but an incomprehensive four-leaf pamphlet as the sole guide to the commanders on the matter of handling animals. This pamphlet was a joke among the remount and veterinary officers on the ground and it was taken by the allied armies as evidence of American incompetence. It was no wonder the Germans, the English and the Italians said we were brave but dumb after the famous second Battle of the Marne and that Marshal Foch was dubious about allowing General Pershing to command his own troops.

The Rule of Common Sense

The Marne incident recalled the chief quartermaster of the Advance Section of the Service of Supply who was so emphatic about a veterinary officer obeying the regulations. The only regulation authorizing us to establish a veterinary hospital for the unfortunate animals and manning it with a remount squadron was common sense, the exercise of which army regulations created for a peacetime army forbade. In short, until broader minds took hold in the A. E. F., nothing went well. Officers who had grown old commanding a troop of cavalry were too slow in grasping new ideas and new methods.

Perfect Organization at Saint Mihiel

I shall always feel proud of the veterinary work done at the Battle of Saint Mihiel. It seems that this offensive was destined to be a smooth-running affair in all the services and departments as well as with the combat forces. With the aid of a company of colored veterinary personnel under the command of Major W. Reid Blair and a remount squadron loaned to the veterinary service; a good set of stables where animals could be collected under shelter; wide-awake corps and division veterinarians; prearranged plans for routing disabled animals, the veterinary service at this first operation under exclusive American command was nothing less than perfect. There was but one missing link—the transportation of the evacuated animals to the far-away veterinary hospitals, not provided by the Service of Supply, a link that remained missing until the end of the hostilities was approaching in October.

Veterinary Service of First Army Inadequate

On the contrary, the Meuse-Argonne operation, undeniably the greatest battle in American history, was a failure at the start from the veterinary standpoint. The personnel acquired for the service could not be brought forward, as the First Army, growing to a million men, marched northward. My improvised units had to be left behind to care for animals collected during the Saint Mihiel operation, because the Service of Supply did not furnish means of disposing of them. Here, the veterinary service in France missed the opportunity of making a good record and of remaining under the command of a veterinarian as chief. As the First Army was marching toward the Argonne, the personnel of its veterinary service consisted of a lieutenant (Hampton), a major (myself) and two enlisted men, a clerk and a chauffeur. It required more than two weeks to acquire a new nucleus from a number of different sources before the First Army service could get a new start.

Meanwhile, the animal situation became serious due to the hard marches and hard fighting. Animals could not be evacuated from the divisions and corps for want of an army personnel and army stations to accept them, and as we gradually gathered a new quota of men and material, and began to relieve the troops of the growing encumbrance, there was no way to dispose of the animals. Cars were refused us by the regulating officer of the general staff and the Service of Supply would not come forward for them. The result was appalling. Animals by the

hundreds accumulated on our hands without means of properly sheltering them and otherwise providing for their care, and when we did find a few men and a car or two to transport them to the far-away veterinary hospitals, many of the weakened brutes either died en route or else arrived in dying condition. The condition of the animals en route and on arrival at the veterinary hospitals was the subject of many a scathing memorandum from the Service of Supply veterinary hospitals. In other words, while that service was not able to do its duty in the matter of relieving the combat troops of their disabled animals, it was nevertheless building up alibis for the poor showing it was bound to make in animal care through conditions of its own making.

Toward the middle of October, through the influence of a member of General Pershing's personal staff of aides, we finally succeeded in acquiring labor troops, casuals and remount squadrons enough to function more systematically. In fact, the situation became so critical that orders were actually issued that men must be taken from the ranks of combat troops to evacuate animals from the army evacuation stations to the veterinary hospitals. The order issued to each of the corps commanders is one of the unknown but outstanding documents of the veterinary service of the American Expeditionary Forces. It is unique in World War history. It shows that the animal situation can become critical but, more particularly in this instance, that not having provided a working veterinary corps of adequate proportions was a grave omission.

The chief veterinarian, A. E. F., seemed to lack the influence to solve these big problems involving the procurement of men and railway transportation and in having left the fighting troops to work out their own salvation, he was relieved and an officer of the mounted service replaced him. This change is one of the unfortunate reminiscences of the war from the professional point of view, but not from the military standpoint, since it must be acknowledged that, under the new chief, practically all of the troubles of the army service were rapidly ironed out.

The despairing days of the veterinary service of the A. E. F. lay between the Battle of Saint Mihiel and the middle of October, in the Argonne, when the service organized for the former operation had to be left behind on battlefields to care for animals evacuated because it had no means of disposing of them and the Service of Supply announced it had no men to send forward. From about October 20, 1918, and until the troops were

entraining for home or well located on the Rhine, the veterinary corps of the A. E. F. made a record of which it can be proud.

The Post-Armistice Period

Commanding the veterinary corps of the First Army after the armistice became a pleasure. It was not only able to keep the incidence of disease down to a low level but, with the aid of the excellent remount officers in the army, corps and divisions, it actually restored to beauty, vigor and the bloom of good health the 19,000 animals it still possessed after horsing up the Army of Occupation. This was quite a contrast to the miserable state of the same number of animals kept under identical conditions the winter before. The post-armistice period was admittedly hard on the veterinary hospitals. The culling of the First Army animals, in order to give the Army of Occupation (Third Army) the best it had, caused an unusual number of evacuations. The number was so great that it was necessary to issue orders to treat all sick animals in the organizations. While this was contrary to the approved customs of war, it served the purpose of demonstrating that with a good veterinary corps and vigilant officers and men, animals can be kept in a satisfactory state of health in station for a considerable length of time.

Resume

In resumé, one should emphasize that a veterinary corps was born to the United States Army for the first time during the greatest military operation in American history, with personnel supplied by other branches of the service and that as the end of the war was approaching, it had grown to a corps as smooth running and as efficient as that of any of the armies on the Western Front.

During my six and one-half months as chief veterinarian of the First Army, the animal strength grew to approximately 100,000. Of these 23,000 were evacuated by the Army unaided by the Service of Supply. My personnel consisted of one veterinary corps unit of 68 men and two officers, two remount squadrons, and casuals and labor troops amounting to over 600 men besides the soldiers drawn from the front lines from time to time to help out. Besides, I had an office force of one captain, three clerks and a chauffeur and an assistant chief veterinarian, Major M. E. Knowles, who commanded the evacuation stations. During this period I served two commanding generals, General

Pershing and General Leggitt, and three chief veterinarians, Maj. Wm. P. Hill, V. C., Regular Army; Lt. Col. D. S. White, V. C., N. A., commissioned from civil life, and Lt. Col. B. F. Merchant, Q. M. C., Regular Army, who served in that capacity until the end of the war.

Besides the honor of having served the First Army during the entire period of its existence, a promotion, a friendly decoration from the French Republic, and a letter to the veterinary corps of the First Army from General Pershing complimenting the corps for its achievements under unusual difficulties, the reward was an experience full of significant details that no stretch of time could eliminate from the memory.

Medical Men Visit Veterinary School

The staff of the gastro-intestinal clinics and the students of the graduate course in gastro-enterology of the Graduate School of Medicine of the University of Pennsylvania attended a meeting at the Veterinary School of the University of Pennsylvania on March 16, 1933.

The program for this meeting was provided by the faculty of the Veterinary School and included visits to the various laboratories, with talks and demonstrations on comparative anatomy, comparative physiology, comparative parasitology and comparative pathology of the gastro-intestinal tract.

This meeting was arranged by Dr. Fred Boerner, Associate Professor of Bacteriology in the University of Pennsylvania Graduate School of Medicine, and was attended by about 45 physicians from the various clinics and graduate course.

New Oklahoma Veterinary Medical Examiners

Members of the Oklahoma State Board of Veterinary Medical Examiners, appointed by Governor William ("Alfalfa Bill") Murray, on January 13, 1933, are as follows: President, Dr. H. Wood Ayers, Oklahoma City; vice-president, Dr. F. Y. S. Moore, McAlester; treasurer, Dr. T. F. Dunham, Clinton; secretary, Dr. Walter H. Martin, El Reno, and Dr. W. W. Bowman, Frederick.

A report of the Committee on Intelligence and Education of the Pennsylvania State Veterinary Medical Association, made at the semi-annual meeting, September 8, 1891, contained the following statement: "The age of the so-called 'Horse Doctor' is gone forever."

BULLA-OSTEOTOMY IN THE CAT*

By J. E. McCoy *and* G. W. McNutt
State College of Washington, Pullman, Washington

A great similarity exists between the dog and the cat, yet there are enough differences to get one into serious trouble if bulla-osteotomy is attempted in the cat in the same manner as it is performed in the dog. Most of these differences are anatomical, necessitating a change in the position of the approach and the use of somewhat different instruments. The operation, in reality, is somewhat more easily performed in the cat. The discussion here is only comparative; for a complete description of bulla-osteotomy the reader is referred to our previous article.[1]

The occurrence of otitis, either externa or media, in the cat has not been recorded very frequently in literature. Its frequency, however, in practice and in the Washington State Clinic has convinced us that infections of the middle ear do occur in the cat (especially older cats) in sufficient numbers to warrant the adoption of the bulla-osteotomy operation for this species.

In the cat we have noted that the symptoms vary only slightly from those in the dog. The shaking of the head is less pronounced, while a profuse and odoriferous discharge is more frequent. The symptom of incoördination is less frequent although the occasional appearance of a "hysteria-like fit" may accompany the disease in its early stages. Definite diagnosis, of course, is dependent upon the establishment of the fact that there is an inflammatory condition or a pus discharge from a deeper source than the external ear. In a case of long standing, palpation of the bulla ossea frequently will disclose its enlargement and tenderness.

Instruments

The selection of the usual scalpel for skin incision, hemostats, scissors, otoscope fitted with cat speculum, alligator forceps, applicators, cotton, gauze, etc., will vary according to the likes and dislikes of the individual operator.

The following instruments especially designed for use in this operation on the dog are perfectly adapted for use on the cat: blunt dissectors, finger-nail drill, Luer bone ronguer, alligator forceps, 5-cc or 10-cc hypodermic syringe fitted with Quitman's probe-points, and teat cannula.

*Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

For a retractor we find that the only satisfactory instrument is an especially designed "cat bulla-osteotomy retractor," which remains open at any position. Thus the only additional instruments needed to adapt this operation to the cat are the special retractor and a cat ear-speculum for the otoscope.

TECHNIC

The preparation, the position of the patient, and the anesthesia are the same as for the dog.

FIG. 1. Ventral view of the skulls of a cat and a fox terrier. The dog weighed about three times as much as the cat. Notice the shorter head, shorter and shallower mandible and great spread of the rami in the cat as compared with the dog. This gives better working space in the cat in spite of its small size. The bulla ossea is about a half again larger in the cat than in the dog. This ratio is greatly increased in favor of the cat in the heavier breeds of dogs.

Many anatomical differences are found between the dog and the cat. The skull of the cat is shorter and broader. The rami of the mandible in the cat are not so deep, are shorter in proportion to the length of the skull, and diverge at a much greater angle. Figure 1 shows a dog and a cat skull. The dog weighed about three times as much as the cat, yet the width between the rami of the mandible is about the same, making a ratio of 1 to 3

in favor of the cat. When compared to larger dogs, this ratio is increased, being as high as 1 to 9 for the largest breeds of dogs. A larger proportion of the cat's skull lies posterior to the rami of the mandible, giving a more open field for operation. The

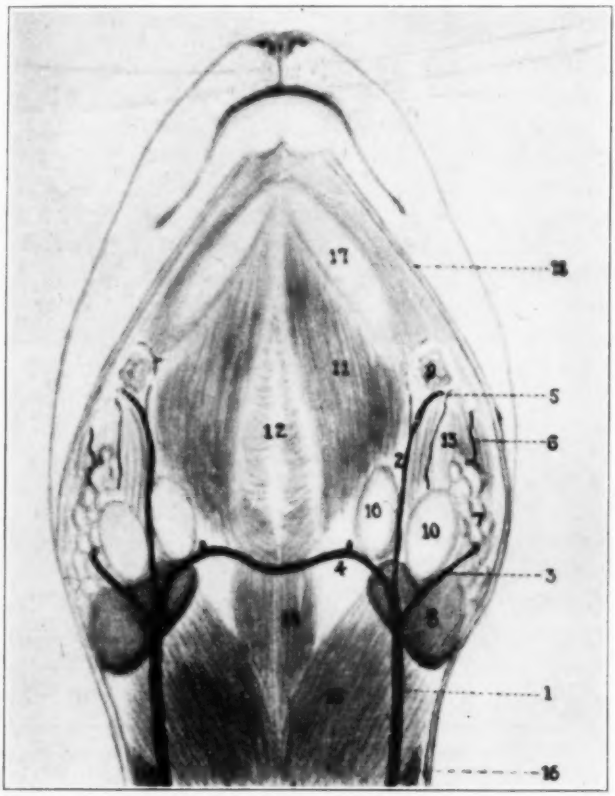


FIG. 2. Dissection showing the ventral view of the head and anterior portion of the neck of a cat. The skin and fasciae have been removed. 1, External jugular vein; 2, external maxillary vein; 3, internal maxillary vein; 4, transverse vein; 5, inferior buccal nerve; 6, parotid salivary duct; 7, parotid salivary gland; 8, mandibular salivary gland; 9, buccal gland; 10, mandibular lymph-nodes; 11, occipitomandibularis muscle; 12, mylohyoideus muscle; 13, masseter muscle; 14, sternohyoideus muscle; 15, sternocephalicus muscle; 16, brachiocephalicus muscle; 17, ramus of mandible; 18, cut edge of skin.

bulla ossea is much larger in the cat and its long axis is more nearly sagittal.

The hyoid bone does not serve as a landmark to locate the bulla ossea in the cat as it does in the dog, but the distance from the

skin to the bulla is not so great in the cat. This fact, together with the extremely large size of the bulla, makes it easily palpated before or during any part of the operation.

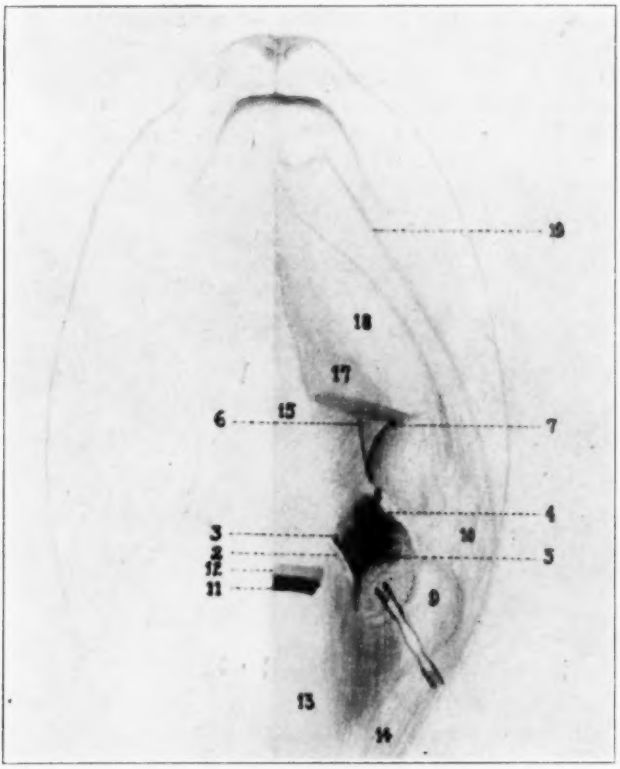


FIG. 3. Deeper dissection of the head shown in fig. 2. A portion of the occipitomandibularis muscle has been removed and the posterior stump laid back to show the deeper structures. The anterior portion only of the bulla ossea is shown as a black area just back of the number 16. The external carotid artery is seen crossing the bulla ossea. 2, Hypoglossal nerve; 3, lingual artery; 4, external maxillary vein; 5, external carotid artery; 6, sublingual artery; 7, facial artery; 8, mandibular salivary duct; 9, mandibular salivary gland; 10, parotic salivary gland; 11, transverse vein; 12 stylohyoideus muscle; 13, sternohyoideus muscle; 14, sternocephalicus muscle; 15, mylohyoideus muscle; 16, styloglossus muscle; 17, occipitomandibularis muscle (a portion of the muscle has been removed and the posterior stump drawn backward and held with a muscle hook in order to show the deeper structures); 18, ramus of mandible; 19, cut edge of skin.

The mandibular salivary gland lies further medially in the cat, being carried medial to the external jugular vein. This, together with the fact that the internal maxillary vein in the cat joins the

external maxillary vein to form the jugular much farther forward than in the dog, makes it undesirable to operate at the same point in the cat as we do in the dog. The internal maxillary vein in the cat passes over the antero-lateral part of the mandibular salivary gland (fig. 2), while in the dog it is found on the posterior border of the salivary gland. This leaves an open field for operation anterior to the internal maxillary vein in the dog, which does not exist in the cat. For this reason we have chosen a point medial to the external maxillary vein and anterior to the transverse vein to make our incision in the cat (fig. 2). This carries us directly down to the bulla ossea. In this position the opening is made lateral to the lingual artery and hypoglossal nerve (fig. 3). The external carotid artery passes obliquely over the bulla ossea. This vessel is forced backward to remove it from the field of operation. The occipito-mandibularis muscle is readily forced laterally and need not be injured. We locate the bulla at all points of the operation by direct palpation and not by following the hyoid bone, as in the dog. The bulla is opened and drained the same as in the dog.

After-Treatment

It has been noted that the shallow canal from the bulla ossea to the external surface has a tendency to stay open for drainage better in the cat than does the deep opening in the dog. Hence the necessity of replacing a gauze pack for a week or ten days is cut down to about five days, followed by daily irrigations until the discharge from the bony cavity has cleared up.

Reference

[1]McNutt, G. W., and McCoy, J. E.: Bulla-osteotomy in the dog. Jour. A. V. M. A., lxxvii (1930), n. s. 30 (5), pp. 617-628.

Discussion

Dr. J. V. Lacroix: I have had no experience treating the cat. My experience in treating the dog has been experimental work. I confess we are backward in this, perhaps, but we do not meet with many cases in the dog in which we believe the operation is indicated.

Dr. E. J. Frick: Although I have never performed the operation, I believe there are good indications for it. In our clinic we have never had a case in which I felt justified in performing this particular operation.

Dr. H. J. Milks: I have had absolutely no experience with this condition in cats. We have operated on two or three dogs, although I do not believe that any really had the symptoms that usually go with inflammation of the osteo-bulla. We have operated for chronic discharges that seemed to be very deeply seated, largely at the request of the persons who sent the dogs in and said they could not do anything but wanted us to do something.

OBSERVATIONS ON THE USE OF PIGEON-POX VIRUS AS A CUTANEOUS VACCINE FOR FOWL-POX IN AN EGG-LAYING CONTEST*

By F. H. ORR, JR., *and* M. W. EMMEL
Alabama Polytechnic Institute, Auburn, Alabama

During the past five years of the Alabama Egg-Laying Contest, fowl-pox has presented an increasingly difficult problem. After arrival at the contest, birds usually showed an increase in production during the first two or three weeks. At this time it has been the rule for mild cases of fowl-pox to appear in scattered pens throughout the contest, causing a decrease in egg-production. Mild cases of fowl-pox would continue to appear in scattered pens over a period of three to four months or apparently until all of the susceptible birds had contracted the disease. Although the disease appeared mostly in a mild form, the cases were of such a character as to reduce egg-production severely during the first four months of the contest when egg prices were at their highest level. During the year 1930-1931, a severe form of ocular roup offered itself as a complicating disease, often causing death of contest birds or resulting in sequelae which impaired the value of the bird for the remainder of the contest.

Although Johnson (Oregon)[1] and Johnson (Virginia)[2] have reported on the use of pigeon-pox virus as a cutaneous vaccine for fowl-pox on mature birds without causing a decrease in egg-production, nothing can be found in the literature on the use of this agent on birds in an egg-laying contest. Believing that such a procedure might be beneficial under the difficulties presented, it was agreed by the contest management that all contest birds would be vaccinated with pigeon-pox virus upon arrival at the contest if the owner had signified that they had not already been vaccinated against fowl-pox.

An effort was made by the contest management to have as many pens as possible vaccinated at home at least 30 days before being shipped to the 1931-1932 contest. Forty-one pens were vaccinated before being shipped, 24 by the stick method and 15 by the follicle method, while the method was unknown in two instances. Fifty-six of the remaining pens were vaccinated with pigeon-pox virus on October 3 by the stick method. Three pens were not vaccinated due to late arrival at the contest. All three of these pens later developed fowl-pox.

---

*Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

Production records were started in the contest on October 1 and observations as to the presence of fowl-pox were made at frequent intervals. Records were kept of the pens in which fowl-pox appeared, but no record was kept of individual birds, as the management was desirous that the birds receive minimal disturbance and handling. Of the 24 pens vaccinated at home by the stick method, 3 developed severe cases of pox, and 5 developed fowl-pox in a form not severe enough to effect egg production, while 14 pens were apparently immune. Of the 15 pens vaccinated by the follicle method, 2 developed severe forms of fowl-pox, 9 pens developed fowl-pox in a form too light to affect egg production, and 4 pens apparently were immune. The two remaining pens did not show any evidence of the disease.

Of the 56 pens vaccinated at the contest with pigeon-pox virus, 12 pens developed absolute immunity, 25 pens developed fowl-pox in a form too mild to affect egg production, and 19 pens developed severe forms of fowl-pox. Eleven of these latter pens developed the disease in less than 14 days after vaccination. One pen (60) was vaccinated October 3 in the midst of a severe form of the disease. Vaccination seemingly lessened the severity of the attack, as egg-production increased rapidly from that date.

Under the circumstances of the experiment definite conclusions cannot be drawn, observations being all that can be offered. While egg-production was quite satisfactory to the contest management, gradually increasing to 64 per cent over a period of 3 months, it showed considerable increase over the same period of the previous contest year. However, one cannot offer strict comparisons on this basis due to the many factors that may cause a variation in egg-production from year to year.

A most promising feature of the experiment was the fact that fowl-pox was confined to a very limited period at the beginning of the contest year, whereas in previous years cases of fowl-pox appeared continually throughout the winter months. Whereas during the last contest year ocular roup appeared as a secondary disease, causing considerable mortality and impairment of individuals for contest purposes, the present contest has been comparatively free of this disease.

Another observation which it seems worth while to mention is the fact that fowl-pox appeared in a number of the birds vaccinated at home after arrival at the contest. While we have no evidence as to the vaccine used, the individuals who did the work or other conditions under which the birds were vaccinated, it would appear that, in view of the experimental data upon vacci-

nation, there should have been more absolute immunity against fowl-pox. Of the 41 pens vaccinated at home, only 20 showed absolute immunity; severe forms of pox were noted in 5 pens and mild forms of the disease in 14 pens.

The use of pigeon-pox virus as a cutaneous vaccine for fowl-pox has proved most satisfactory to the management of the Alabama Egg-Laying Contest this year and the results seem to warrant its use in future contests in this state.

REFERENCES

[1]Johnson, W. T.: The effect of fowl- and pigeon-pox virus vaccination on egg-production. Jour. A. V. M. A., lxxviii (1931), n. s. 31 (1), pp. 98-101.
[2]Johnson, E. P.: Results of experiments with the use of pigeon-pox virus as a cutaneous vaccine against fowl-pox. Jour. A. V. M. A., lxxix (1931), n. s. 32 (1), pp. 81-86.

DISCUSSION

DR. E. P. JOHNSON: Do you believe, from your work, that the stick method should be used or do you expect to use the stick method for the pigeon-pox virus?

DR. EMMEL: These birds were vaccinated at the college and we used the stick method more or less on account of economy. We had only a limited amount of pigeon-pox vaccine. This year we started in plenty of time and expect to vaccinate them all, some with the follicle method.

As Others See Us

The American Veterinary Medical Association holds a place comparable to the Royal College of Veterinary Surgeons in Great Britain and exercises an influence on the setting of standards in the profession. Veterinarians must be graduates of acceptable schools to gain admission. Besides the demand for private practice in rural localities, especially in connection with the growing dairy industry, the Bureau of Animal Industry, United States Department of Agriculture, employs about a thousand veterinarians as meat inspectors, quarantine agents, and in extension work. The Veterinary Corps is a division of the Medical Department of the Army. Veterinary graduates are also in demand for state veterinarians, as teachers and as government research workers.—*Encyclopaedia Britannica*, 14th Ed., xxiii, p. 114.

Cattle and Sheep on Feed in U. S.

An increase of 5 per cent in the number of cattle on feed in the principal Corn Belt states on January 1, 1933, as compared with the number one year ago, is reported by the U. S. Department of Agriculture. Sheep and lambs on feed have decreased 15 per cent.

A DETAILED STUDY OF NO-LESION, TUBERCULIN-REACTING CATTLE*

By E. G. HASTINGS, WALTER WISNICKY, B. A. BEACH *and* JANET MCCARTER

Department of Agricultural Bacteriology
University of Wisconsin,
and the Division of Live Stock Sanitation
State Department of Agriculture and Markets
Madison, Wisconsin

HISTORY OF THE NO-LESION ANIMAL PROBLEM

The tuberculin test was used in this country first, speaking in a general way, on herds in which the incidence of tuberculosis was high, as, for example, the pure-bred herds. The number of animals examined was small compared to present-day standards. In the period from 1894 to 1908, 36,900 cattle were tested in Wisconsin, of which 12.6 per cent reacted. In Wisconsin, in recent years, as many cattle have been tested in one week as were examined in the 14-year period. In this earlier period only selected herds were tested, while in the later period all herds have been examined.

Then, as now, the test proved to be very accurate. The testing of an infected herd, the removal of the reactors, followed by one or two retests, in the great majority of cases, sufficed to eliminate tuberculosis from the herd. Apparently the reacting animals showed lesions of tuberculosis in such a high percentage of cases that the question of the possible sensitization to tuberculin by any other agent than the tubercle bacillus was not raised. When no lesions were found in reacting animals, the case was always considered a positive one, with the disease either in the incipient state or in the occult form.

Again, during the two decades following the introduction of the tuberculin test, students of bacteriology were united in their belief in the absolute specificity of microörganisms. They had not begun to think very definitely of groups of organisms. The initial experiences with the serum reactions also led to belief in specificity. Within recent years bacteriologists have come to speak of groups of organisms and to include in their consideration of the serum reactions the question of the so-called group reactions. It is commonly admitted at present that organisms may be very closely

*Published with the permission of the Director of the Wisconsin Agricultural Experiment Station. Received for publication, August 26, 1932.

related as far as antibody and anaphylactic reactions are concerned and yet be very different in their physiology and pathogenicity. A marked example of this is the avian tubercle bacillus and the bacillus of Johne's disease, organisms which are entirely different in pathogenicity and certainly markedly different in their general physiology. The diagnostic agent made with one can be used apparently as successfully for the diagnosis of the disease produced by the other organism as it can for the detection of the disease produced by itself. Other similar examples could be presented.

It seems quite probable that the very early experience with the tuberculin test scarcely would have justified the belief in its high specificity. The following is a quotation from a recent article[1]:

> Prior to February, 1892, Prof. A. Eber, a veterinary investigator of Berlin, collected statistics on 134 cattle that had reacted to the test and had been killed. He selected these animals from those that he considered had been properly tested, that is, where a proper dose had been used, temperature measurements correctly taken and recorded and autopsies made by reliable authority. Eber found that lesions had been reported in 85.82 per cent of the 134 animals. He made similar observations on 113 cattle that had passed a satisfactory test. No lesions were found in 89.38 per cent. The others showed lesions. His observations proved the reliability of tuberculin as a diagnostic agent.

As far as the writers are aware, the first authority to emphasize the limitations of the tuberculin test was the late Dr. V. A. Moore, who discussed in some of his papers the various aspects of the subcutaneous test. As the testing of cattle became more common, it became more difficult to maintain the previous ideas regarding the specificity of the test. The experience in Wisconsin reflects the change.

As has been stated, in the period from 1894 to 1908, inclusive, 36,900 cattle were tested in the State, 12.6 per cent of which reacted. The experience with the test seemed satisfactory in every respect. Under the leadership of the College of Agriculture the economic significance of bovine tuberculosis was brought to the attention of the students of the College, and, through its extension facilities, to a large number of the cattle-owners of the State.

Interest in tuberculosis was heightened also by the slaughter of reacting cattle at gatherings of farmers. The result of this educational campaign was to increase greatly the number of animals tested. Another stimulus was found in the law enacted by the legislature of Wisconsin requiring the testing of all cattle sold for breeding and dairy purposes. This law was in force for

approximately one year. The result of these activities was a remarkable increase in the number of cattle tested in Wisconsin. In 1909, 48,000 cattle were tested; in 1910, 207,000; and in 1911, 32,000. It is believed that the tests made in these three years in Wisconsin represented the first time in which the average run of herds was tested in this country. It would thus be expected that the percentage of reacting animals would be markedly less than in previous years when the pure-bred herds formed the major part of those examined. Such was found to be the case. Of the animals tested from 1909 to 1912, 3.6 per cent reacted to the test as compared to 12.6 per cent in previous work. In 1910, when the greatest number of animals was tested, the reactors found amounted to 3 per cent.

At this period the no-lesion problem obtruded itself in Wisconsin. The percentage of reacting cattle that failed to show lesions of tuberculosis on slaughter was 17.2 per cent in 1909, 21.8 per cent in 1910 and 12.2 per cent in 1911. It is to be noted that the highest percentage occurred in the year in which the average herd made up a greater part of the total animals tested than in any other year. The explanation then advanced for the occurrence of no-lesion cases was that a large part of the testing had been done by laymen. It was argued that if the testing had been done entirely by professional men, the no-lesion problem would not have appeared. A study of the records, however, showed that the no-lesion case was not connected with the type of tester but apparently did have a direct relation to the type of herd tested. In those herds in which the incidence of tuberculosis was low, a high percentage of the reacting cattle failed to show lesions. Table I is reproduced from Bulletin 243[2] of the Wisconsin Agricultural Experiment Station, published in 1914.

The experience of veterinarians and of students of bovine tuberculosis had been such as to cause the belief that no other

TABLE I—*The relation of occurrence of lesions to the extent of the disease in each herd.*

ANIMALS REMOVED FROM HERD	HERDS FROM WHICH ANIMALS WERE REMOVED	ANIMALS KILLED	NO-LESION ANIMALS	
			No.	%
1	1,063	1,063	468	44.0
2	346	692	248	35.8
3 or 4	210	699	18	26.9
5 to 9	207	1,167	135	13.1
Above 10	120	2,105	145	6.8

animal than a tuberculous animal would react to tuberculin. The comparatively few reacting animals which failed to show lesions of the disease on slaughter and the consistent success with which herds were freed from tuberculosis through the use of the test were ample reasons for believing in its absolute specificity. No one was thinking of the no-lesion problem as it exists today, and hence this problem had to obtrude itself into the vision of the students of bovine tuberculosis. The introduction of the intradermal test made possible the examination of great numbers of animals at small expense. It led to the area method of testing cattle, in which the average run of herd has been the unit examined under these conditions. The no-lesion case has become as important in some parts of the country as apparently it was in Wisconsin in 1910. The complete discussion of the no-lesion problem prepared by Dr. W. A. Hagan[3] renders unnecessary its general presentation here.

As soon as testing became general, it became evident to the students of bovine tuberculosis that the accuracy of the test should be expressed in terms of animals tested rather than of animals reacting, for otherwise the no-lesion case would make up an alarming percentage of the cattle slaughtered, and its expression in terms of reacting cattle would lead to unwarranted conclusions by the cattle-owners.

Previous to the general testing of cattle the skin lesion was practically unknown. Such lesions were found in a considerable part of the reacting cattle which came to slaughter after the test became general. It offered another source of relief from the trouble which the no-lesion case presented. There was reason to believe that skin lesions were tuberculous in nature, for they almost constantly revealed acid-fast organisms. The mass of evidence which has accumulated during the past few years, however, would indicate that the skin lesion is not tuberculous in origin but is apparently due to some other member or members of the group of mycobacteria.

The no-lesion case seems to vary widely in incidence in different sections of the country. In some areas it is still claimed that practically all reacting cattle show lesions of tuberculosis. The most extreme example of the no-lesion case is that presented by Daines[4] in his recent paper, in which data supplied by the representative of the federal Bureau of Animal Industry in Utah showed that but 254 cattle out of 3,323 reacting animals revealed internal lesions of tuberculosis, the remainder showing skin lesions or no detectable evidence of tuberculosis.

The no-lesion case has gradually forced its recognition by a hostile audience, until it is believed there are few areas in which great numbers of tests are being made in which the problem is not now deemed worthy of consideration by the live stock sanitarians.

Cause of non-specific reactions: If one admits the possibility of sensitization to tuberculin by any other cause than the bovine tubercle bacillus, he is likely to turn to one of the other types of tubercle bacilli, the human or avian, as the probable cause. It seems quite probable that each of these may in some cases be the explanation. The saprophytic organisms of the tubercle group present another possible explanation for the non-specific sensitization. Two of the authors of this paper have presented in a previous paper[5] observations on sensitization to tuberculin produced in cattle by the injection of acid-fast bacilli, other than tubercle bacilli, isolated from the tissues of no-lesion, reacting cattle. (The expression "no-lesion" is used rather than the more common "no-visible lesion." The implication of the latter is that every such animal is a tuberculous one; of the former, that some such may be free from tuberculosis, at least from any tubercle bacillus which needs to be considered from the standpoint of the continued health of the herd.) The writers think that the observations just referred to should be taken as indicating the possibility, not the probability, that organisms similar to those studied may be responsible for some part of the no-lesion cases.

Feldman[6] has obtained positive responses to tuberculin in a part of the fowls inoculated with some of the cultures which gave positive results in the work just referred to.

There is no reason for believing that the human tubercle bacillus, the avian, or any of the saprophytic mycobacteria can produce a progressive type of disease in cattle, and one which can be transmitted to other members of the herd.

The possibility of sensitization to tuberculin by bacteria other than the mycobacteria exists. Holth,[7] of Norway, who has encountered the no-lesion problem and who has expressed it in the following striking manner, namely, that the tuberculin test discovers more tuberculosis in the cattle of Norway than exists, has recently mentioned the possible relation of Bang's disease or contagious abortion of cattle to the tuberculin test. He has found that guinea pigs inoculated with *Brucella abortus* sometimes react to tuberculin. He tested the cattle of some tuberculosis-free herds which were infected with abortion,

> . . . with the result that in some of the infected cows a positive reaction to tuberculin was observed which from all appearances

must be due to the infectious abortion itself. In herds with chronic abortion the number of such reacting animals was not particularly large, whereas in one experiment, where the inoculated animals had recently been infected by the abortion bacillus, there occurred relatively many such reactions. There came reaction both with the intradermal injection method and with the thermo-test, although the results were not always in concordance. We must therefore in the future take into account these possibilities for error in tuberculin tests in cases of herds of cattle infected by the abortion bacillus.

These interesting observations of Holth should be extended. A wealth of data could be collected quickly in this country which would indicate the validity of the suggestion. It is believed that one of the deficiencies of the tuberculosis-eradication program in this country has been the lack of study of collected data. A huge pile has collected in the records of state and federal agencies, but almost no effort has been made to draw some useful knowledge from it by study.

Originally the writers had thought that some change in the technic of the test or in the diagnostic agent might help to avoid whatever error exists in our present procedure. It soon became evident that this represented a faint hope, and that while the test itself could not be modified, the interpretation of the results might, and that instead of basing the conclusion as to the presence or absence of tuberculosis in a herd on the test alone the herd-history might be invoked to aid. As the counties are tested and retested, a history, official and private, of each herd accumulates. If a herd has a negative history as regards bovine tuberculosis over a number of years, a reaction in one animal of the herd has a different import than a reaction in a herd with a history of tuberculosis. Objection may be made that there are many ways in which the bacillus may enter a herd. As the areas brought under control become continuous and extended, the danger of the reinfection of herds becomes less, and especially in such a territory as is represented by the major part of Wisconsin, from which cattle are constantly passing and into which almost none is passing.

The control official is in constant fear of "breaks," with the resulting injury to the prestige of his work, especially in removing territory from the modified accredited area. The slow spread of tuberculosis from herd to herd in a great part of our country in which the condition is similar to that existing in much of Wisconsin is indicated by the data of Wisconsin. In the areas in which the herds were relatively static, the incidence of tuberculosis was found to be low on the initial area test in spite of a long period, 40 years or more, of intensive dairying. Such data

indicate that the spread of tuberculosis from herd to herd is slow in areas in which the herds are largely static and more rapid in areas in which constant buying is taking place. They indicate the possibility of using a procedure in one section which might be inadvisable in another.

Study of One-Reactor-per-Herd Animals

With the idea of testing the relative safety of introducing the history of the herd to supplement the tuberculin test in determining the condition of a herd, the work about to be described was done. It had been noted that the no-lesion case made up a larger part of that group of reacting animals which consisted of one-reactor-per-herd individuals than of the groups consisting of two or more reactors per herd. It seemed wise to begin the work with the one-reactor-per-herd group, and to extend it to other groups if the results seemed to warrant.

The history was obtained largely from the owner of the herd, whose recollection of the results of the tests of his herd was usually vivid and correct. The completeness of the history turns as much on the historian and his approach to the personalities involved as on the herd-owner. The official records also served as source material. It appears from our experience that a reasonably complete history can be unearthed in areas in which dairying is intensive, or in those areas in which the herd is the chief concern of the owner rather than a side issue to some other branch of farm work.

Group 1

In the second complete test of a county the inspectors were requested to report immediately those herds in which but one animal reacted. A portion of the farms thus brought to our attention were visited by one of us for the purpose of learning the history of the herd. Fifteen herds were selected as points of origin of an equal number of reacting animals, the maximum number the financial status permitted. Each owner was requested to allow the animal to remain in the herd for subsequent retesting, and for removal and slaughter irrespective of the results of the retests.

The essential details are presented in table II.

The retests were made by one of us about 90 days following the test in which the reactors were found. The animals were killed at an establishment maintaining federal inspection, and were examined in greater detail than usual. Cervical, thoracic and mesenteric lymph-nodes were removed from each animal.

TABLE II—*Results of retesting and postmortem examination of 15 one-reactor-per-herd animals.*

HERD AND ANIMAL	AGE	INTRA-DERMAL REACTION	SUBCUTANEOUS REACTION		LESIONS ON SLAUGHTER
			MAXIMUM PRE-INJECTION TEMPERATURE	MAXIMUM POST-INJECTION TEMPERATURE	
1	10	Negative	100.8	105	Nodules, supra-mammary gland
2	6	Negative	101.6	102.4	None
3	3	Negative	102.2	105.4	None
4	7	Negative	102	105.2	Skin
5	4	Negative	102.2	101.6	None
6	3	Negative	101.6	103.4	None
7	3	Negative	102.4	103	None
8	7	Negative	102.2	102	None
9	3	Negative	101.8	103.6	None
10	3	Negative	101.6	104	Skin
11	3	Negative	102.2	102.8	None
12	3	Negative	102	104.4	Skin
13	2	Negative	102.4	102.4	None
14	6	Negative	101.4	102.2	Skin
15	4	Negative	101.6	104	None

Suspensions of these tissues were injected into guinea pigs, rabbits and fowls. After treatment with 50 per cent antiformin for 20 minutes, the tissues were cultured on Dorset's egg medium.

It is to be noted that suspicious lesions were found in only one animal, which will be discussed in detail later.

The results of the animal and cultural tests of the lymph-nodes were negative in every instance, with the exception that an acid-fast organism, which has proven to be other than a tubercle bacillus, was obtained from animal 3, which was one of the animals giving a positive reaction to the thermal retest.

A retest of the herds from which the animals came, six months after the test in which the reactors were found, revealed no reactors.

The following are the results of the inoculation of animals with the lymph-nodes of animal 1:

Rabbits: Negative results.

Chickens: Negative results.

Guinea pigs: Four out of six showed minor lesions as follows:

1. Died after 4 months, showing subcutaneous lesions and also lesions in liver and spleen.
2. Killed after 5 months. One large caseous lesion in the liver. Many acid-fast rods were found in the lesion microscopically.

3. Subcutaneous lesion only.
4. Subcutaneous lesion only.

Cultures were prepared from the lesion found in guinea pig 2. No growth was obtained. The inoculation of 2 guinea pigs and of 2 fowls from guinea pig 2 yielded only negative results. One rabbit inoculated died after 4 months. No changes were found other than an enlarged spleen in which nothing could be found microscopically.

The lesions above discussed were found in the supramammary lymph-nodes. They were neither caseous nor calcified, and were not considered typically tuberculous in appearance. It is believed that one is justified in concluding that animal 1 was not tuberculous, in spite of the positive reaction in the retest with the thermal method. The entire record for this animal is not so clear as for the remaining fourteen.

It is to be noted that the intradermal retest was negative in all animals. The subcutaneous was positive in 6 of the 15, as shown in table III. Animal 14 also showed a skin lesion but no temperature response.

Through the kindness of Dr. Seibert, of the University of Chicago, it was possible to have the blood of a part of the 15

TABLE III—*Thermal test and autopsy of six animals.*

ANIMAL	MAXIMUM POST-INJECTION TEMPERATURE	LESIONS ON SLAUGHTER
1	105.0	Supramammary lymph-nodes (?)
3	105.4	None
4	105.2	Skin
10	104.0	Sk n
12	104.4	Skin
15	104.0	None

animals examined by means of the precipitin test. Table IV presents the results of such tests.

It is to be noted that the three types of tubercle bacilli and the timothy bacillus, as a representative of the non-pathogenic acid-fast bacteria, were used as antigens. The figures show the highest dilution in thousands, of the antigen with salt solution, which gave a precipitate with each serum and each antigen. Values less than 20 have little significance. It is also to be noted that the serum from the known tuberculous cow gave a positive test in the highest dilution used, 1 part of antigen to 50,000 parts of salt solution.

TABLE IV—*The highest dilution (expressed in thousands) of antigen giving a precipitate in the precipitin test.*

ANIMAL	4	6	7	8	9	10	11	12	14	15	KNOWN TUBERCULOUS COW
Antigen:											
Human	5	1	5	2	2	2	10	2	10	5	50+
Bovine	1	—	2	—	10	—	10	1	10	2	50+
Avian	2	—	2	1	1	1	1	1	2	10	20
Timothy	2	—	1	—	—	—	1	—	1	1	2
Controls	—	—	—	—	—	—	—	—	—	—	1

GROUP 2

A second group was selected, in another county undergoing the second complete test of its cattle, from herds with a history of freedom from tuberculosis. Instead of allowing the animals selected to remain on the farms of origin, it was planned to segregate them for continued observation at the Experiment Station. The selection of the animals and the obtaining of the history of the herds were done by a member of the State's regular inspection staff. Again, each animal represented a herd, except in one instance in which two reactors were taken from one herd. Thirteen herds thus were represented.

It was recognized that the presence of an open case of tuberculosis in the group might interfere with the results. The segregation of the animals, however, offered an opportunity for longer and more detailed study than would have been possible if the animals had been allowed to remain in their respective herds. The details of the histories are presented in table V.

The two reactors found in 1925, in the herd from which animal 2 came, showed no lesions of tuberculosis on slaughter. Animals 11 and 12 came from the same herd.

Animal 5, a male, was tested once, then slaughtered soon after the group was formed. Animal 6 died before more than the one retest was made. The tests were negative in both instances, as were the postmortem examinations. For the above reasons these animals will not appear in the detailed discussion.

The use of avian tuberculin was suggested by the observations of Plum, of Denmark, who believes that some animals which have associated with tuberculous birds may become sensitized and may react to both mammalian and avian tuberculin. He further thinks it possible in many instances to determine the

TABLE V—*The history of the animals forming the second group studied.*

ANIMAL	PREVIOUS HERD TESTS	RESULTS OF PREVIOUS TESTS	CONDITION OF POULTRY
1	11	No reactors	Unknown
2	1924, 1925, 1926, 1928	2 reactors in 1925	Healthy
3	1928	No reactors	Tuberculous
4	4	No reactors	Tuberculous
5	1928	No reactors	Healthy
6	1928	No reactors	Possibly tuberculous
7	1928	No reactors	Tuberculous
8	1928	No reactors	Healthy
9	1928	No reactors	Tuberculous
10	1928	No reactors	Tuberculous
11	4	No reactors	Healthy
12	4	No reactors	Healthy
13	1928	No reactors	Tuberculous
14	1928	No reactors	Healthy

nature of the sensitizing agent by the extent of the reaction, this being more marked when the diagnostic agent is an extract of the causal organism. Inasmuch as the poultry on a part of the farms was tuberculous, it was thought the sensitization might have been produced by association with the birds, and would be better detected by avian tuberculin than by mammalian. It also seemed that a double injection with each tuberculin would be advisable.

The details of the various retests are presented in table VI, as are the postmortem findings. For ease in viewing, the positive reactions in each test are segregated in table VII.

Each of the 12 animals, with the exception of No. 1, gave a positive response to one or more of the various tests made at the first retesting period. The number giving a positive response at the second test period was six, and at the third, none. The sensitization apparently was disappearing.

Ten tests were made on each animal with mammalian tuberculin, and six tests with avian tuberculin. It is to be noted in table VI that but a single animal (No. 1) gave consistent responses to either tuberculin, the response in every case being negative with either tuberculin. This animal originated in a herd which has long been on the accredited list.

The animal showing the highest degree of consistency as to positive responses to tuberculin is No. 13. Out of ten chances to react to mammalian tuberculin, a positive result was noted in six cases and a suspicious result in two cases. Out of six chances to react to avian tuberculin but one positive result was noted.

TABLE VI—*The detailed results of the 16 tests made on each animal of the second group.*

Animal	Results of 1st Retest (40–50 Days)						Results of 2nd Retest (120–130 Days)					Results of 3rd Retest (230–240 Days)					
	Intradermal		Intradermal (Avian)		Thermal	Eye	Intradermal		Intradermal (Avian)		Thermal	Intradermal		Intradermal (Avian)		Thermal	Lesion
	T	V	T	V			T	V	T	V		T	V	T	V		
1	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
2	+	−	+	+	+	−	+	−	−	−	−	−	−	−	−	?	+
3	+	−	+	−	−	−	+	−	+	−	+	−	−	−	−	?	−
4	−	−	−	+	−	−	−	−	−	−	−	−	−	−	−	?	Skin
7	+	−	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−
8	?	+	+	+	−	+	−	−	+	−	−	−	−	−	−	−	−
9	−	−	+	+	−	+	−	−	−	−	−	−	−	−	−	−	−
10	+	+	+	+	−	+	−	−	−	−	−	?	−	?	−	−	−
11	+	+	+	+	−	+	−	−	+	−	−	−	−	−	−	−	−
12	−	−	+	−	+	−	+	−	+	−	−	−	−	−	−	−	Skin
13	+	+	−	+	+	+	+	+	−	−	?	?	−	−	−	−	+
14	+	−	+	−	−	+	−	−	−	−	−	−	−	−	−	−	−

T=tailfold.
V=vulva.

TABLE VII—*The number of animals of the second group reacting at the different test periods and to the different tests (12 animals in all).*

METHOD	1ST RETEST	2ND RETEST	3RD RETEST
Intradermal test:			
Tailfold	7	4	0
Vulva	4	1	0
Intradermal test (Avian tuberculin):			
Tailfold	9	4	0
Vulva	8	0	0
Thermal test	4	1	0
Ophthalmic test	6	—	—

The number of positive reactions to each tuberculin at each period of testing is presented in table VIII. The suspicious reactions have been classed as positive in this table.

The number of animals reacting to mammalian tuberculin and to avian at each period of testing is shown in table IX.

In these data suspicious reactions have been classed as positive. In table V the condition of the poultry is given for ten of the 12 farms represented. It is to be remembered that animals 11 and 12 came from the same farm, a farm on which the flock was earlier tuberculous, now healthy. The degree of confidence to be placed in such a report is in question.

If one were to hazard a guess as to the cause of the sensitization of the animals from the data presented, it would be that the avian tubercle bacillus had something to do with it, since on eight

TABLE VIII—*The number of positive responses to ten injections of mammalian tuberculin and six injections of avian.*

ANIMAL	MAMMALIAN TUBERCULIN	AVIAN TUBERCULIN	POULTRY
1	0	0	Unknown
2	4	2	—
3	4	2	+
4	0	1	+
7	2	2	+
8	3	3	—
9	1	2	+
10	4	3	+
11	3	3	±
12	2	2	±
13	8	1	+
14	2	1	—

TABLE IX—*Reactors at three periods.*

1ST PERIOD		2ND PERIOD		3RD PERIOD	
MAMMALIAN	AVIAN	MAMMALIAN	AVIAN	MAMMALIAN	AVIAN
8	11	4	4	2	1

of the 11 farms there was apparently opportunity for such a cause to be operative. The somewhat greater number of positive responses to avian than to mammalian tuberculin may be cited as supporting evidence for this theory. If animal 13 is omitted for reasons to be presented, the above figures become those shown in table X.

The change is in the direction of incriminating the poultry as the source of the sensitizing agent. The reader is left to draw his own conclusions as to the significance of the data in indicating a possible rôle for the avian tubercle bacillus in the no-lesion problem. There are reasons for not incriminating the avian tubercle bacillus, one being that the no-lesion case is apparently frequent in regions relatively free from avian tuberculosis.

It would seem that the eradication of avian tuberculosis may be necessary in order to establish such conditions in any area that

TABLE X—*Reactors at different periods.*

1ST PERIOD		2ND PERIOD		3RD PERIOD	
MAMMALIAN	AVIAN	MAMMALIAN	AVIAN	MAMMALIAN	AVIAN
7	10	3	4	2	1

no reactions will be obtained in cattle injected with mammalian tuberculin. It is possible that the human tubercle bacillus may now and then be responsible for the sensitization of cattle to tuberculin.

The herds in which the different animals forming the second group originated were retested six months after the original test. No reactors were found. The animals were slaughtered soon after the last tests were completed. Skin lesions were found in animals 4 and 12. Animals 1, 3, 7, 8, 9, 10, 11 and 14 were negative as to lesions, leaving animals 2 and 13 to be discussed.

As in the study of the first group, cultures were prepared from the lymph-nodes of each animal. Guinea pigs, rabbits and fowls were injected with a suspension of the nodes. The results were negative in the case of each of the following animals: 1, 2, 3, 4, 7, 8, 10, 11, 12 and 14. From the lymph-nodes of animal 9 was isolated an acid-fast organism which proved by cultural tests and animal inoculation to be an avian tubercle bacillus.

Suspicious lesions were found in the retropharyngeal glands of animal 2. The appearance was not that of a tuberculous lesion. The cultural and animal tests were negative. Stained sections of the lesions showed the presence of *Actinomyces bovis*.

Lesions of tuberculosis were found in the lungs, and in the cervical, bronchial and mediastinal glands of animal 13. The guinea pigs and rabbits inoculated with the tissue showed frank tuberculosis, and from the lesions was isolated a culture of the mammalian tubercle bacillus.

A retest of the herd from which animal 13 came ten months after the original test revealed three reactors, one of which showed a lesion in a bronchial gland, the other two in the mesenteric glands. It is interesting to note that the retest, six months after the original test, revealed no reactors.

An attempt to supplement the history of the herd as first obtained brought out conditions which, if recognized at the time of the original test, would have excluded the animal from the group. It was discovered that there had been at least two possible opportunities for the infection of the herd: one the purchase of a bull from an infected herd, the other the association, for a time in pasture, of three animals, the identity of which could not be established, with a herd found to be almost 100 per cent tuberculous.

Discussion

It seems clear from the experience of many years in the use of the tuberculin test, both thermal and intradermal, and from the data assembled in this paper, that some part of the animals reacting to tuberculin are not tuberculous but that the sensitization to tuberculin shown by them must be due to other than the bovine tubercle bacillus, the only organism known to produce a progressive type of tuberculosis in cattle. As has been intimated in this paper, the avian bacillus may be responsible for some part of the no-lesion cases. It is conceivable that the human bacillus may function, and also saprophytic acid-fast bacteria. It has been shown quite clearly that the number of no-lesion cases does not decrease in the same proportion as the

frank cases of tuberculosis, as the eradication of the disease in cattle progresses, and thus the no-lesion case makes up a larger part of the total number of reacting cattle as bovine tuberculosis is forced to lower and lower planes of incidence.

In the initial stages of eradication, the no-lesion case may well be neglected. It is questionable whether it can wisely be neglected in the final stages. It is not certain how much the suggestion made in this paper will aid in preventing the removal of no-lesion cases. It is believed, however, that the suggestion is worthy of trial in the field, the only place in which final answer can be given to the specific questions, "Can the history of the herd be of value in supplementing the tuberculin test?" and "If so, what are the conditions under which such supplementation is relatively safe?"

It has been our purpose to test the relative safety of allowing the herd history to supplement the test in 28 herds with a negative record as regards bovine tuberculosis and which revealed but one reactor each in a general test of the area. In one case the history was faulty, due to the reticence of the owner or the inexperience of the historian as a collector of facts. It is believed the data justify the statement that in the case of the remaining 27 herds the animals removed could have been left with no danger to the herds. On this basis the following question presents itself: Which is preferable in the interest of live stock sanitation, to kill 100 animals in order to be certain of destroying three tuberculous ones or to allow the three tuberculous ones to live for a period with the expectation of detecting them before the disease spreads to other animals? This is a question of public import, to which, it is believed, the live stock sanitarian should give consideration, without being forced to do so by his public.

Beginnings have already been made. We understand that in Norway a herd is classed as tuberculous only when lesions have been found in a member of the herd or when a reactor reacts on a retest. In this country an accredited herd is not removed from the list if a reacting animal therefrom fails to show lesions, and no-lesion animals are not counted in determining whether an area is to be classed as modified accredited or not. In Wisconsin, herds in which no-lesion reacting animals have been demonstrated are placed on the suspected-herd list until they have passed one completely negative test; while herds from which animals showing lesions have been removed are kept on the suspected-herd list until they have passed two negative tests.

The individual inspector permits his judgment to be influenced by the herd history in making his final decision. In lack of any official recognition of the wisdom of allowing herd history to enter the matter, there can be no uniform procedure, while with it the safety of the suggestion would soon be established and a desirable and uniform procedure formulated.

There are still other reasons for believing that some part of the no-lesion animals have been sensitized to tuberculin by other than the bovine tubercle bacillus. Among them are the following: The ease with which a herd can be made free of tuberculosis seems to bear little relation to the percentage of the herd which reacts to tuberculin on the original test, as is shown in the data assembled by the federal Bureau of Animal Industry and presented in table XI. Again, the ease with which the percentage of cattle reacting to tuberculin can be reduced to the level demanded for classification of an area as modified accredited, or to approximately that value, seems to bear little relation to the incidence of tuberculosis revealed on the first test of all the cattle in the area, as is shown in the data (table XII) in which all the counties in Wisconsin have been grouped according to the percentage of reacting animals found on the first test.

It is to be noted that the percentage found on the second test of all herds is of the same order of magnitude irrespective of the original value. In one county the original infection found was 39.8 per cent, and that found on the second test of all herds was 0.66 per cent. It is true that in this county a greater part of the herds were tested between the first and the second tests of all cattle than is usually the case. It would seem that if the bovine tubercle bacillus is the only agent sensitizing cattle to tuberculin, such data would not present themselves. It would seem also that the difficulty encountered in reducing the percentage of reacting cattle to a low level would be in direct relation to the percentage of infection found on the first examination. Such a condition is not indicated by the data just presented.

SUMMARY

The detailed study of two groups of cattle consisting of one-reactor-per-herd animals indicates that some other organism or organisms than the bovine tubercle bacillus may sensitize cattle to tuberculin.

The organisms to which consideration should be given in this connection are the avian and the human tubercle bacilli, possibly

TABLE XI—*Number of tuberculin tests required to free herds of tuberculosis.*

HERDS	CATTLE	1ST TEST %	2ND TEST %	3RD TEST %	4TH TEST %	5TH TEST %	6TH TEST %	7TH TEST %	8TH TEST %	9TH TEST %
16,080	327,972	12.2	0.0							
4,608	114,271	18.0	5.9	0.0						
2,137	61,965	18.6	6.8	4.1	0.0					
1,039	34,879	18.0	6.6	3.4	3.1	0.0				
386	18,321	17.0	6.4	4.4	3.3	2.8	0.0			
188	7,980	10.3	3.4	3.9	2.6	2.1	2.1	0.0		
79	3,908	11.9	3.2	3.1	2.8	1.7	2.6	1.8	0.0	
33	2,005	18.9	4.1	4.7	3.5	4.2	7.1	1.9	2.3	0.0
24,550	571,301									

TABLE XII—*Incidence of tuberculosis at first and second tests.*

ORIGINAL INCIDENCE	INCIDENCE AT SECOND TEST (%)
Less than 1%	0.33
1% and less than 2%	0.31
2% and less than 3%	0.44
3% and less than 4%	0.23
4% and less than 5%	0.90
5% and less than 10%	0.65
10% and more	0.62

Johne's bacillus, and the saprophytic members of the tubercle group of bacteria.

It is believed that the observations herein recorded indicate that the herd-history may, in the final stages of the eradication of bovine tuberculosis, serve as a supplement to the tuberculin test. It may prove possible to avoid the removal of a considerable part of those animals which now form the no-lesion group without endangering the eradication work in any way, by allowing herd history to influence the judgment as to the condition of the herd as regards tuberculosis.

REFERENCES

[1]Marshall, C. J.: Progress in controlling bovine tuberculosis. Jour. A. V. M. A., lxxx (1932), n. s. 33 (4), pp. 625-633.

[2]Hastings, E. G.: What has been done with the tuberculin test in Wisconsin. Wis. Agr. Exp. Sta. Bul. 243 (1914).

[3]Hagan, W. A.: The no-lesion case problem in the tuberculosis eradication campaign. Corn. Vet., xxi (1931), 2, pp. 163-176.

[4]Daines, L. L., and Austin, H.: A study of so-called skin-lesion and no-visible-lesion tuberculin-reacting cattle. Jour. A. V. M. A., lxxx (1932), n. s. 33 (3), pp. 414-433.

[5]Hastings, E. G., Beach, B. A., and Thomson, I.: The sensitization of cattle to tuberculin by other than tubercle bacilli. Amer. Rev. Tuber., xxii (1930), pp. 218-225.

[6]Feldman, W. H.: Addresses given at Eighth Annual Midwestern States Tuberculosis Conference, Madison, Wis., May 25-26, 1932. (Mimeographed material issued by H. R. Smith, Union Stock Yards, Chicago, Ill.)

[7]Holth, H.: Vedvarende feber hos kastningsinfiserte kuer samt kastningsinfeksjon som årsak til tuberkulinreaksjon hos storfeet. Saertrykk av Norsk Vet.-Tids., xliv (1932), 5.

Golden Anniversaries

Dr. Charles Courtney McLean, of Meadville, Pa., this month rounds out fifty years of active service in the veterinary profession. He was graduated from the Ontario Veterinary College in 1883 and has spent his entire professional career at Meadville. He was a pioneer in advocating milk and dairy inspection, and was one of the original ten veterinarians appointed to conduct state meat inspection in Pennsylvania under the law passed in 1907. Dr. McLean is still actively engaged in general practice and raises English bulldogs as a hobby. He joined the A. V. M. A. in 1887. Dr Bailey Courtney McLean (U. P. '20), of Aiken, S. C., is a son.

Dr. J. C. Whitney, of Hillsdale, Mich., is another veterinarian who has been in harness for fifty years this spring. He was graduated from the Ontario Veterinary College in 1883, in the same class with Dr. McLean. Dr. Whitney is one of the two surviving charter members of the Michigan State Veterinary Medical Association, organized July 23, 1883, Dr. Joseph Hawkins (Ont. '71), now on Harbor City, Calif., being the other.

THE SEROLOGICAL IDENTITY OF STRAINS OF ERYSIPELOTHRIX RHUSIOPATHIAE OF OVINE AND PORCINE ORIGIN*

By HADLEIGH MARSH, *Bozeman, Montana*
Montana Veterinary Research Laboratory

In a previous article[1] there was described a chronic arthritis in lambs caused by infection with *Erysipelothrix rhusiopathiae*. As this disease occurs in sheep that have no contact with swine, and as swine erysipelas is not known to occur in regions where arthritis has been observed in lambs, it was of interest to determine whether the ovine strains of this organism were identical in every particular with strains from cases of swine erysipelas. As reported in the previous article, our sheep strains corresponded exactly in cultural reactions and pathogenicity to the published descriptions of *E. rhusiopathiae*.

A further comparison of ovine and porcine strains of this organism has been made by the use of cross-agglutination reactions. For this work there were available several strains of the organism isolated from lesions in Montana lambs; a lamb-arthritis strain received from New Zealand, through the courtesy of Dr. C. S. M. Hopkirk; and a swine erysipelas strain kindly supplied by the late Dr. John S. Buckley, of the U. S. Bureau of Animal Industry.

Agglutinating serums were prepared in rabbits by repeated intravenous injections of killed cultures of strain 190, from a Montana lamb; strain 90, from a New Zealand lamb, and strain 250, from a case of swine erysipelas. An antigen was prepared from each of the three strains. In the preparation of the antigen, the organism was grown on serum-agar, and the growth washed off and suspended in physiological salt solution containing 0.5 per cent phenol. The opacity of the suspension was adjusted to a Gates nephelometer reading of 6 cm.

Each antigen was tested against each of the three rabbit serums, and also against a swine erysipelas serum obtained from the U. S. Bureau of Animal Industry, and a serum prepared by the Lederle Laboratories. The antigen was used in 1-cc amounts, and 13 dilutions of serum were made in each case, from 1:25 to 1:100,000. The tubes were held in an incubator at 37.5° C. for 24 hours, and the results were read at the expiration of that time. The results of the cross-agglutination tests are shown in

*Contribution from Montana State College, Agricultural Experiment Station, Paper No. 25, Journal Series. Received for publication, November 2, 1932.

TABLE I—*Cross-agglutination tests with serums from rabbits immunized against ovine and porcine strains of E. rhusiopathiae.*

ANTIGEN	SERUM	1:25	1:50	1:100	1:200	1:400	1:800	1:1,600	1:3,200	1:6,400	1:12,800	1:25,000	1:50,000	1:100,000
190 (Montana lamb strain)	Rabbit immunized against ovine strain 190	++	++	++	++	++	++	++	++	±	−	−	−	−
	Rabbit immunized against ovine strain 90	++	++	++	++	++	++	+	+	±	±	−	−	−
	Rabbit immunized against porcine strain 250	++	++	++	++	++	++	+	+	±	−	−	−	−
	Swine erysipelas anti-serum (B. A. I.)	++	++	++	++	++	++	++	++	++	++	++	++	++
	Swine erysipelas anti-serum (Lederle)	++	++	++	++	++	++	++	++	++	++	++	++	+
	Normal rabbit	−	−	−	−	−	−	−	−	−	−	−	−	−
90 (New Zealand lamb strain)	Rabbit immunized against ovine strain 190	++	++	++	++	+	+	+	±	−	−	−	−	−
	Rabbit immunized against ovine strain 90	++	++	++	++	++	++	++	++	+	+	+	±	−
	Rabbit immunized against porcine strain 250	++	++	++	++	++	++	++	+	+	+	±	−	−
	Swine erysipelas anti-serum (B. A. I.)	++	++	++	++	++	++	++	++	++	++	++	++	++
	Swine erysipelas anti-serum (Lederle)	++	++	++	++	++	++	++	++	++	++	++	++	+
	Normal rabbit	±	−	−	−	−	−	−	−	−	−	−	−	−
250 (Swine erysipelas strain)	Rabbit immunized against ovine strain 190	++	++	++	++	++	++	++	+	+	+	±	−	−
	Rabbit immunized against ovine strain 90	++	++	++	++	+	+	−	−	−	−	−	−	−
	Rabbit immunized against porcine strain 250	++	++	++	++	++	++	++	+	±	−	−	−	−
	Swine erysipelas anti-serum (B. A. I.)	++	++	++	++	++	++	++	++	++	++	+	+	+
	Swine erysipelas anti-serum (Lederle)	++	++	++	++	++	++	++	++	++	+	+	±	−
	Normal rabbit	−	−	−	−	−	−	−	−	−	−	−	−	−

table I. Complete agglutination is recorded as ++ ; partial agglutination as + ; and very slight agglutination as ±.

The table shows that all the serums agglutinated all the antigens, and that the titre was somewhat higher in the case of the homologous serum. In the case of antigen 190, complete agglutination was recorded at 1:3200 for serum 190, while serums 90 and 250 agglutinated completely at 1:800. Antigen 90 was agglutinated completely by serum 90 at 1:3200, serum 250 at 1:1600, and serum 190 at 1:200. Antigen 250 was agglutinated completely by serums 250 and 190 at 1:1600, and by serum 90 at 1:200. Both the ovine antigens were agglutinated in higher dilutions by the swine erysipelas antiserums than was the porcine antigen. No agglutination occurred with serum from a normal rabbit.

These results show clearly that the three strains of *E. rhusiopathiae* (one from a Montana lamb, one from a New Zealand lamb, and one from a case of swine erysipelas) are serologically identical as far as agglutinins are concerned.

REFERENCE

[1]Marsh, H.: The bacillus of swine erysipelas associated with arthritis in lambs. Jour. A. V. M. A., lxxviii (1931) n. s. 31 (1), pp. 57-63.

Wild Dogs in New Jersey

New Jersey hunters are on the trail of several packs of wild dogs which have been roaming the game-filled Ramapo Mountains in the northern part of the State for nearly 15 years. They are said, by those who have seen them trailing game, to have the blood of many breeds—German shepherd, Airedale, collie, hound—supposedly abandoned or runaway pets. Their destruction is sought not only because of their game-killing habits, but also because it is feared that an outbreak of rabies might occur, endangering the whole district. It is planned to set steel wolf traps in the mountains to catch them.

Visitors at the Century of Progress

Pre-fair interest in the Century of Progress Exposition at Chicago is being exhibited to an unusual degree, as witness the record number of visitors on a recent Sunday—16,947 persons. A 10-cent admission charge permits the visitor to drive through the grounds and go through most of the completed buildings. An additional fee is required for some of the exhibits, such as the Lincoln group and the replica of Fort Dearborn.

A BIOLOGICAL AND BACTERIOLOGICAL STUDY OF BOVINE MASTITIS*

By J. M. ROSELL, *Oka, Quebec, Canada*
Veterinary School of Quebec
and W. T. MILLER, *Washington, D. C.*
Pathological Division, U. S. Bureau of Animal Industry

There are a number of methods available for the diagnosis of mastitis in dairy cattle at the present time. Several of these appear to be of considerable value and have been the subject of much investigation in the past, particularly in Germany. This work was undertaken to contribute further information relative to these tests and the bacteria present in the samples of milk tested from both healthy and diseased quarters. For this purpose, 70 animals in various stages of lactation were selected indiscriminately and the individual quarters studied.

These animals are part of a herd of several hundred milking cows, maintained to supply milk to a large institution near Washington, D. C. Because of the necessity of producing milk of good quality and with a low bacteria count, the general conditions under which these animals are kept are very good. All of the milking is done by hand and each milker has a certain number of individual cows regularly assigned to him. All replacements for the herd, with the exception of the bulls, are raised on the premises. Regular veterinary supervision is maintained and the general health of the herd is good. It is accredited with respect to tuberculosis, and infectious abortion has not been diagnosed.

Mastitis has been present to a certain extent at all times, but its incidence, as judged by the usual clinical means (clots on the black cloth filter and gross changes in the udder), is low at this time. Milk production per animal is above the average and routine bacteriological tests show a low bacteria count.

HISTORY

The mastitis caused by streptococci was described by Nocard and Mollereau[27] in 1884. Since that time a number of methods have been described to facilitate the diagnosis of the condition. These tests have been used extensively in the past and are being employed with some success at the present time to recognize mas-

*Work done in the Pathological Division, Bureau of Industry, Washington, D. C. Received for publication, November 11, 1932.

titis, which may be caused by any of the usual etiological agents. As a result, a considerable literature has developed, which Seelemann[44] and Rosell[36] have compiled in a more or less complete bibliography.

Among the earliest reports of the relation of lowered acidity of milk to changes in the udder were those of Storch[48] and Höyberg.[18] Later, Baker and Van Slyke[2] and Baker and Breed[1] investigated this same point, using brom cresol purple to test the degree of acidity. Baker and Breed checked the results obtained with this indicator by means of several others, among which was included brom thymol blue. This indicator has been used extensively in recent years by Roeder,[32] Gloy and Bischoff,[14] Seelemann,[44] Rosell,[36] and a number of others in Germany, Canada and the United States.

Of the other tests which have been developed, Ernst,[11] Roeder,[33] Rüdiger, Mayr and Wurster,[37] Koestler, Lehmann, Lörtscher and Elser,[24] Pröscholdt[31] and Ehrlich[10] have contributed papers concerning catalase. The chlorin test has been used by Guillebeau and Hess,[17] Burr,[5] Drost,[7] Bischoff,[4] Gloy and Bischoff,[14] Schulze.[41] Rosell[34] and many others.

The macroscopic sediment test for the determination of increased leucocytes in milk was used by Trommsdorff[49, 50] some 25 years ago. Since that time the test, or certain modifications of it, have been included in the study of mastitis by Klimmer,[21] Ernst,[13] Rühm,[38] Gminder,[15] Gressel and Schönberg[16] and numerous other investigators.

The microscopic determination of the number of leucocytes in milk has become a routine procedure in sanitary milk control. Various methods for counting leucocytes and the results obtained with their use have been reported by Doane,[6] Prescott and Breed,[30] Bergey,[3] Schönberg,[40] Skar,[46] Koller,[25] Slack,[47] and Rullmann and Trommsdorff[39] among others.

Since the original isolation and description of *S. agalactiae* by Nocard and Mollereau[28] in 1887, many papers have been published which confirm their work and extend it. Among these are the publications of Zschokke,[51] Ernst,[12] Gminder,[15] Jones,[20] Seelemann,[43] Klimmer and Haupt,[22] Klimmer, Haupt and Roots,[23] Minett, Stableforth and Edwards,[26] Rosell[35] and Edwards.[9]

PROCEDURE

Since a bacteriological study was to be made of each quarter, it was necessary to exercise as much care as possible to exclude outside contamination while the milk sample was being drawn.

For this purpose the tail, hind quarters, and udder of each animal were sponged with a mild, disinfectant solution and, immediately before the sample was taken, the udder and teats were washed thoroughly with a 70 per cent solution of ethyl alcohol, care being taken to wipe the orifice to the teat-canal thoroughly. After the first two or three streams of milk were discarded, the sample (40 to 50 cc) was drawn into a large, sterile test-tube with as little stripping of the teat as possible. The tube was then placed in ice water.

Prior to the collection of the milk sample, the udder was palpated for clinical evidence of mastitis and a few streams of milk were drawn upon a black-cloth filter. Immediately after this step, a small amount of milk was taken from each quarter in separate test-tubes for the brom thymol blue or pH test. The results of these procedures were recorded at the farm. The other tests were made in the laboratory as soon as practicable on the cooled milk sample.

Biological Tests

These tests with a few variations are as reported by one of the authors:[34]

The brom thymol blue test was made by drawing 2 cc of milk from one quarter into a test-tube previously graduated to that amount. One-half cc of a solution of brom thymol blue (0.75 gm in 1 liter of 68 per cent alcohol) was added to each of the four samples and the tubes shaken. The resulting colors were compared with freshly made standards and recorded in terms of pH.

The standard was made by adding a proportional amount of brom thymol blue to a quantity of milk, and distributing this mixture in tubes of the same size as those used for taking the test samples. The various concentrations of acidity and alkalinity were obtained by adding N/10 HCl or N/10 NaOH to the milk until the desired pH was reached. The range covered was from pH 6.0 to pH 7.6. A pH of 6.6 or over was considered as evidence of disease and, in case of a variation of 0.2 between quarters in the same animal, the one with the higher reading was considered as being abnormal.

The black cloth test was used to determine the presence or absence of clots in the milk. The first streams of milk from each quarter were drawn upon a piece of black cloth stretched tightly over a medium-size tin cup. The cloth was rinsed after being used for each animal. The presence of clots was indicative of mastitis.

The catalase test was made on each sample as soon as possible after the milk reached the laboratory. This test consists of mixing 5 cc of freshly prepared 1 per cent hydrogen peroxid and 15 cc of milk which has been well shaken to insure an even distribution of leucocytes. This mixture is then placed in a Smith fermentation tube and the closed arm filled, care being taken to exclude all air bubbles. The tube is allowed to stand for two hours in the incubator, or 12 hours at room temperature. In making this test it is very desirable to use fresh milk and freshly prepared hydrogen peroxid. However, it is possible to use milk preserved with 1 per cent formalin or milk which has been held in the ice-box for 24 hours. In the two latter cases, a smaller amount of oxygen will probably result from some loss of catalase and this factor must be considered in making the reading. The reading is made by measuring, with a centimeter scale, the colume of gas which may collect in the closed arm of the tube. The results are tabulated in centimeters. In this work values over 0.5 cm are considered as abnormal and those over 1.5 cm as being definitely diseased.

The chlorin test is carried out by adding 40 cc of distilled water to 10 cc of milk in a small beaker. Eight to ten drops of a 10 per cent solution of potassium chromate are added to give a canary yellow color to the diluted milk. N/10 silver nitrate solution is run in from a burette until the first permanent deep orange color appears. The amount of silver nitrate necessary to produce this change multiplied by 0.0355 gives the chlorid content (in grams) present in 100 cc of milk.

The work of other investigators has shown that an amount of sodium chlorid in excess of 0.1420 gm is probably evidence of disease in that quarter. Any results above that value, therefore, have been considered as positive in this work.

The macroscopic sediment test consisted of centrifuging 10 cc of milk at 3,000 r.p.m. for 15 minutes. The supernatant fluid was then drained off and the character and quantity of sediment observed. In this test sediment exceeding approximately 0.1 cc was considered abnormal, especally if the color indicated the presence of pus (yellow) or blood (red).

The microscopic sediment test was made by adding a drop of sterile physiological sodium chlorid solution to the sediment in the tube and mixing well. The contents of a loop (1 mm in diameter) of this mixture was spread over an area of approximately 1 cm. The film was allowed to dry in the air and stained with Loeffler's methylene blue. In judging the results of this

test, an average of 6 to 10 leucocytes per field was considered normal, and over 10 to 12 as being diseased. This figure has been taken, based upon the work of several other investigators. It is believed, however, that in perfectly healthy quarters the leucocyte content should be considerably less, probably not exceeding 2 or 3 cells per field. If the preparation is made from unsedimented milk, this work has shown that less than one leucocyte per field is found in healthy quarters.

In making the sediment test, it should be pointed out that there is some possibility of having an uneven distribution of leucocytes because of the tendency of these cells to rise to the cream layer of the milk and, therefore, not appear in the sediment. This can be avoided to some extent by diluting the milk with equal parts of distilled water and warming the mixture to 45 or 50° C. before centrifugation. In centrifuging this mixture, it is essential that the maximum speed of the centrifuge be reached as quickly as possible.

For the bacteriological examination of the sample, two large (4 mm) loops full of milk were placed on the surface of 5 per cent blood-agar and on Klimmer-agar* plates and spread evenly over half of the area. These plates had been made on the preceding day to permit any moisture present on the surface to dry. For this test, the milk samples were cultured before any of the other tests were made. After incubation for 48 hours, the resulting growth was observed and the kind of colonies noted. If no growth occurred, the plates were inoculated again from the sediment or from the incubated milk samples.

Cultures were made from the streptococcus colonies in 5 per cent horse serum infusion bouillon for microscopic and further bacteriological study. Numerous colonies of micrococci and also small granular rods were cultured in the same medium for further study. It was felt that this procedure would be of value for confirmation of the diagnostic tests and the results obtained

*KLIMMER AGAR (Brom-cresol-purple-saccharose-serum-albuminate agar). *Medium:* 100 cc of serum alkali albuminate solution (9 parts of sterile horse serum and 1 part of 15 per cent NaOH solution, heated ½ hour in streaming steam, but not neutralized) is made up to 1 liter with 3 gm Liebig's meat extract, 5 gm peptone, 10 gm saccharose, 20 gm agar, and distilled water in the usual manner, and adjusted to pH 7.2. Add 4 cc of a saturated aqueous solution of brom cresol purple. Tube and sterilize in autoclave for 20 minutes at 15 pounds pressure.

Results: In 24 hours the mastitis streptococci colonies grow to a diameter of 0.5 mm, are dark yellow, almost opaque in the center, surrounded by a small cloudy border and a larger bright yellow halo. In comparison the bacterioscopically similar milk-acid streptococci (*S. lactis* Lister—Lohnis) as a rule form quite small, almost colorless, dewdrop-like colonies, which do not color the surrounding medium. Moreover, a colony of mastitis streptococci is like a ball of yarn, somewhat broken on the edge and on this account not sharply rounded.—Klimmer, M.: "Tierärztliche Milchkontrolle." (Richard Schoetz, Berlin, 1929) p. 31.

would also be an additional contribution to the bacteriology of both healthy and diseased udders.

RESULTS

In reporting the results of this work, only the more important ones will be considered for the sake of brevity. The tables which have been compiled for comparative purposes are long and somewhat extended for publication. In recording the results the individual quarter is considered as the unit rather than the individual animal.

Two hundred and eighty individual quarters were examined at least once in their clinical, biological and bacteriological aspects and some of the tests were repeated on many quarters during the course of the work.

After the first examination, 42 (15 per cent) of the total number of quarters were found to be free of disease (that is, they failed to react to any of the tests enumerated); 232 (82.8 per cent) showed some abnormality with one or more of the tests and, therefore, should be considered diseased. Of these latter quarters, the distribution of their reaction to the various tests was as follows:

50 reacted to 1 test	34 reacted to 5 tests
42 reacted to 2 tests	17 reacted to 6 tests
39 reacted to 3 tests	11 reacted to 7 tests
35 reacted to 4 tests	

On succeeding tests, the results were not the same in all cases and quarters which were abnormal on the first examination had become negative, while in others the degree of the reaction had increased. As an example, quarters which had a normal pH and were abnormal in chlorin or catalase on the first test showed a changed pH in later tests or the reverse of these conditions occurred. Likewise, negative quarters reacted to one or more tests on the second examination, while others failed to change.

This is not an unusual observation in the study of various diseases and indicates that when measures are being taken for the eradication of mastitis, repeated examinations of the udder would probably be beneficial and also that a combination of these different tests would be of great value in determining the exact status of the disease in the herd. It should be pointed out that failure to detect all quarters which can be considered abnormal is a quality common to all single tests, as will be observed in the following results.

In general the results obtained in this study are more or less similar to those of Gloy and Bischoff,[14] Seelemann,[44] Roeder,[32]

Hucker,[19] and Rosell.[36] However, all of these investigators have found a somewhat better agreement between the various tests in the diseased quarters than has occurred in this herd. Rosell, in a similar comparative study in Canada, after testing approximately 3,000 quarters, found that in about 85 per cent of these cases the results of the pH, catalase, chlorin and sediment tests agreed closely and that the most frequent cause of mastitis (*S. agalactiae*) could be isolated from the diseased quarters in the first culture in only 70 per cent of the cases.

In this herd, the disease appears to be extensively disseminated among the animals and of a chronic character. There are few visible symptoms aside from palpation and the milk supply is not influenced to so great a degree as is usually the case in chronic mastitis. In addition, the biological symptoms apparently are variable to some extent on different days. This is especially true of the pH, which is more frequently normal in this herd than is usually found in other herds affected with the chronic form of the disease. Because of these facts it is believed that the results found in this work may be of interest.

Of the 230 quarters considered diseased, 151 (65.6 per cent) were positive upon palpation, among which were four atrophic, non-functioning quarters, showing more or less extensive irregular, fibrotic induration in the udder tissue.

In 15 quarters only, the appearance of the milk was abnormal macroscopically and by filtering through a black cloth.

The pH in the first test was abnormal in 69 (30 per cent) of the diseased quarters. This is an unusually low percentage which might be considered as peculiar for this particular case, inasmuch as positive values for the pH have been found to vary between 70 and 90 percent of the diseased quarters by practically all observers. Furthermore, it was found that in addition to a fluctuation from day to day, as previously noted, the pH varied between the fore milk and the strippings. In carrying out the brom thymol blue test, this fact should be considered in the estimation of the results. In view of our present knowledge it is not possible to offer any explanation concerning the reason for this variation.

One hundred and ninety-two quarters (82.7 per cent) had an increase in chlorin above the normal limit. For this test, values above 0.1420 gm per 100 cc of milk were considered abnormal. In Europe the quantity of chlorin considered to be normal varies from 0.10 to 0.12 gm. The studies of Rosell[36] in the province of Quebec in Canada indicate that quantities of chlorin up to 0.1420

gm occur in the milk of cows in which no other symptom of the disease could be found. Since the chlorin test is believed to be very accurate, a method for its use in the stable, at the same time as the brom thymol blue test is made, is described.

STABLE TEST FOR CHLORIN DETERMINATION*

Five cc of milk are drawn directly from the quarter into a test-tube graduated for that amount. Eight to ten drops of a 10 per cent solution of potassium chromate are added to give a canary yellow color to the milk. Four cc of a freshly prepared N/20 silver nitrate solution is then run in with a pipette or syringe and the mixture gently shaken.

The immediate appearance of a reddish color is indicative of a chlorin content of 0.1420 gm or less in 100 cc of milk and, therefore, is to be considered a negative reaction. If the color remains unchanged, the quarter is diseased. Since this is a quantitative reaction, the addition of one or two cc more of the silver nitrate solution may give a rough idea of the extent of the increase in chlorin.

Of the diseased quarters, 167 (72.6 per cent) had an abnormal quantity of catalase. Although it is believed that a quantity of catalase in 15 cc of milk capable of producing more than 0.1 or 0.2 cm of oxygen should be considered abnormal, values over 0.5 cm have been taken as abnormal in this study. This test also is of considerable value in the diagnosis of mastitis in the opinion of many investigators and, in the majority of reports upon this subject, it has been described as being 80 to 90 per cent accurate, with which the figure of a little over 72 per cent found in this work agrees fairly well.

At present the most satisfactory test for catalase is strictly a laboratory procedure. However, a rapid test may be made in the stable by mixing five or six drops of milk with two or three drops of freshly prepared 9 per cent H_2O_2 on a piece of flat glass over a dark background. The appearance of bubbles, within a minute or two after mixing, is considered a positive reaction. Greater accuracy can be obtained by observing this reaction with a hand lens. In view of the fact that a large number of leucocytes are required to produce such a reaction, it is probable that many cases of actual mastitis might be overlooked, if this test alone were used.

*Since this test has been used, an article by Dr. C. E. Hayden has appeared in the *Cornell Veterinarian* for August, 1932, vol. 22, p. 277, which describes several tests for the same purpose.

One hundred and thirty-seven quarters (59.5 per cent) gave evidence of disease in both macroscopic and microscopic sediment tests. Unfortunately 25 tests were not recorded. Macroscopically four of the quarters contained blood. Microscopically, in addition to the usual leucocytes and fibrin, 69 samples (about 30 per cent) showed chains of streptococci in incubated milk samples. A great many more contained masses of micrococci and occasionally small diphtheroid rods were seen.

Streptococci were found in 94 (41 per cent) of the quarters on either blood-agar or Klimmer-agar plates, or both.

Discussion

On the basis of these results, the chlorin test has given the largest number of positive reactions and the catalase test is next. A comparison of these two tests shows that, in the quarters in which the catalase test was positive, only 12 failed to react to the chlorin test. As previously stated, over 0.1420 gm of chlorin per 100 cc has been considered as abnormal, but it is entirely possible that if the figure of 0.12 gm of Gloy and Bischoff[14] and Seelemann[42] had been used as the normal limit, this discrepancy might not have occurred. Of the quarters positive to the chlorin test, 60 did not react to the catalase test. Finally it was found that, in this number of diseased quarters, the chlorin test alone was positive in seven only and the catalase test alone in two.

Of the other tests, palpation of the udder indicated the largest number of diseased quarters and, of the 151 quarters positive to this test, only 14 were negative to any of the other tests. There were 96 quarters in which no pathological change could be detected by manipulation of the udder but which were positive to one or more of the other tests.

The sediment test yielded approximately the same number of positive results as palpation of the udder. With the brom thymol blue test all of the quarters found to be diseased were positive to one or more of the other methods. But in this particular herd, as previously pointed out, the number of quarters found to be diseased by this test was proportionally smaller than has been found in similar studies by other investigators. There is no adequate explanation for this result other than the possibility that, in mastitis of a chronic nature, the acid reaction of the milk is not greatly altered by the disease, or that the sample may have been taken at a time when the pH happened to be normal. It is possible that, if another test had been made on the following day, a different result might have been obtained. It has also

been pointed out before that, in spite of the presence of mastitis in many of the animals, the milk production has remained high. This is unusual when the extent of the mastitis is considered and it might be possible that these two peculiarities may be explained on the same basis, which is unknown at the present time.

It is believed, in view of the small number of quarters found to be positive with the black-cloth test, that it is of limited usefulness in detecting the presence of mastitis in such a herd.

BACTERIOLOGICAL STUDY

The method used in taking the samples of milk for the bacteriological study and the other tests has been described in another part, but it is believed advisable to point out in somewhat further detail the precautions which were used in taking these samples. The conditions in this herd were very favorable for the exclusion of outside contamination from the sample. In addition to cleansing the hind quarters of the animals, the stable floors were thoroughly washed with a hose before each milking. In this way a minimum of dust was present in the stable. After the udder and hind quarters of the animal had been washed with a mild antiseptic solution and the udder with 70 per cent alcohol also, the tail of the animal, together with the tails of the two neighboring animals, was fixed. But with all these precautions it was found that in taking a large sample of milk (about 50 cc) all external contamination could not be avoided. It is recommended, therefore, that in taking samples for bacteriological study but one stream of milk be drawn into a small, sterile test-tube. Subsequent testing of this method has shown that much outside contamination thus can be avoided, although there is the possibility that with the use of such a small quantity, not all of the species of bacteria present in the udder will be found in one sample of the milk, thus necessitating investigation of several samples.

After the plates upon which the milk was spread had been incubated for 48 hours, the isolated colonies of streptococci, micrococci, and diphtheroid rods were picked into 5 per cent serum broth. After a further incubation of 24 hours, these cultures were examined microscopically for purity and morphology. In the examination of the morphology, the length of the chains and the shape of the cocci, together with any abnormalities in the organisms, were noted. In the event that the broth culture was found to be pure, approximately 0.1 cc was added with a sterile

pipette to each tube of the culture media usually employed for the identification of mastitis streptococci. The same method was used for the cultures of micrococci and diphtheroids which were studied.

The appearance of a streptococcus colony on ordinary nutrient agar is round, with finely granular edge, smooth, transparent, with a slightly dark center, and ordinarily no larger than 1 mm after 48 hours. The colonies may be smaller (0.5 mm) and rarely larger than 2 mm. Sometimes, in wet agar, the edge observed through the microscope seems slightly curled and irregular. When touched with a platinum loop the colony often shows a mucoid consistency. The colonies do not always present the same smoothness. Some colonies, especially those obtained from the inoculation of the sediment of mastitis milk and from which the streptococci are difficult to cultivate, spread in an irregular manner in their conformation and dimensions. It is possible that this irregularity in the form of the colonies, and also the difficulty of cultivation of streptococci from such sediment may be due to bacteriophagic or other unknown inhibiting factors in the milk.

The morphological arrangement of streptococci taken from an agar colony frequently corresponds to that of micrococci or staphylococci. The streptococci on ordinary agar rarely appear in long chains but on wet Klimmer agar frequently take this form. Cultures from colonies on agar, grown in broth, give the most typical chain arrangement if the streptococci are able to form chains. In successive recultivations the arrangement and dimensions of chains and morphology of individuals may vary and the type of medium used may exert considerable influence.

In 1 per cent lactose serum broth (pH 7.2 to 7.4) a flocculent sediment is produced after incubation for 16 to 24 hours, leaving the liquid clear and transparent. There are, however, some cultures of mastitis streptococci which leave the broth cloudy under certain circumstances, especially the streptococci of the short-chain or diplococcus type. After the cultures are shaken, the broth often remains more or less cloudy. Cloudiness after incubation for 24 hours always denotes short chain formation, while a flocculent sediment and clear supernatant liquid indicate long chains.

Litmus milk (7 to 10 per cent litmus) is one of the most valuable culture media for differentiation of mastitis streptococci from *S. lactis*, *S. pyogenes*, and other varieties of streptococci.

Mastitis streptococci in fresh culture produce the following typical changes at 37° C. in litmus milk prepared with litmus tincture: First, the medium is acidified and reddened in 18 to 24 hours; then the milk is coagulated in 20 to 40 hours with a consistent and homogeneous curd, with or without the extrusion of a little serum. A strialike formation along the curd is often present. At the bottom of the test-tube there often appears a slight reduction of litmus, this reduction never extends over halfway up the length of the column of milk, and after incubation for three or four days at 37° C., the evidence of reduction tends to disappear, especially if the column is high (10 to 15 cm). Lactic streptococci first coagulate the milk, then reduce it to a white color with a narrow red ring remaining at the top of the tube within 24 hours. It is very seldom that other varieties of streptococci produce changes in litmus milk similar to those brought about by the mastitis and *S. lactis* forms. If this does occur, as it may occasionally with *S. pyogenes*, the other cultural characteristics usually permit differentiation. A few strains of mastitis streptococci may produce a more or less pronounced reduction of litmus milk after two or more days and there are also some strains which cause coagulation and acidification to take place slowly.

The majority of strains of mastitis streptococci produce no change in methylene blue milk (1:20,000). However, it has been found by experimentation carried on in connection with this work that the kind of dye used in making up this medium is of considerable influence. Many of the strains of streptococci isolated in this herd were found to cause coagulation and reduction of the medium after incubation for two to three days at 37° C. Methylene blue milk was then made, using medicinal methylene blue dye, and also dye which had been recrystallized from an alcoholic solution of the original sample. In these two latter solutions, coagulation and reduction were found to be either not so pronounced or did not occur at all. In addition it was found that even in the medium made with the more concentrated samples of dye, the amount of inoculum added made a difference in the action of the streptococci. Quantities of culture of 0.05 cc failed to cause a change in the medium, whereas 0.5 and 1.0 cc of the culture caused reduction and coagulation. This, however, usually occurred after incubation for two or three days. It would appear advisable, therefore, to observe the reaction in this medium after the first 24 hours of incubation. In addition to the mastitis streptococcus, *S. kefir* and *S. acidiminimus* and some species

of *S. bovis* do not reduce methylene blue milk. It is always reduced and coagulated by lactic streptococci.

Blood agar was made by adding 5 per cent sterile defibrinated horse blood to ordinary beef-infusion agar. By spreading the milk over the surface of the agar, the types of colonies were much easier to see. In poured blood-agar plates deep colonies of mastitis streptococci frequently are surrounded by a zone of incompletely hemolyzed red cells, which might occasionally be construed as beta hemolysis. By plating on the surface, the possibility of such an error is minimized while true hemolysin-producing strains of streptococci, such as *S. pyogenes*, will cause marked lysis of the red cells when spread upon the surface of the agar. Several other methods were used to test the hemolytic ability of these strains. One consisted of transferring a disc of 5 per cent blood-agar about 1 cm in diameter to the 24-hour broth culture. This was allowed to stand in the incubator for several hours and the color of the disc observed. If the red color had disappeared, the presence of hemolysin was evident. The other test was the usual one of adding 1 cc of the 24-hour broth culture to 1 cc of a 5 per cent suspension of washed sheep red cells in physiological salt solution. After several hours in the incubator, a clear diffuse red color of the fluid indicated the presence of hemolysin. There was no evidence of hemolysis of the beta type according to Brown's classification nor of the *S. viridans* type with any of the 41 strains isolated, nor with any of the *S. mastitidis* strains forwarded from other laboratories. Rosell[35] has obtained similar results with more than 300 typical strains of mastitis streptococci.

The carbohydrates used for testing the various strains of organisms were: 1 per cent lactose, saccharose, salicin, mannite, raffinose and inulin made with beef extract and 1 per cent sterile horse serum added, together with Andrade's indicator (except lactose). The lactose broth without indicator was used both for determining the degree of acidity colorimetrically after incubation for four days at 37° C. and also the character of the growth. The majority of the strains grew with a rather profuse flocculent sediment and clear supernatant fluid and the final pH ranged between 4.4 and 4.6.

Of the other test substances, saccharose and salicin were regularly fermented, although saccharose was acted upon rather weakly by several strains. The regular fermentation of salicin by these strains of streptococci (only two strains failed to ferment) is of interest because of the fact that of some 30 or more strains of

mastitis streptococci isolated from samples of milk obtained in another herd, where mastitis is present in an acute form, only one salicin-fermenting strain was found. Somewhat similar results have been obtained by Edwards.[9] Mannite was fermented weakly by several strains and raffinose was fermented by two strains. There was no action on inulin.

Sodium hippurate was not tested regularly in this work, but gelatin and nitrate broth were inoculated. Gelatin was not liquefied and nitrates were not reduced by any of the strains.

The various strains of micrococci isolated had a variable action on the sugars, in some cases resembling the reactions of the streptococci, but in all instances they could be distinguished by their action on gelatin or nitrate broth or both. Nitrites were found to be produced in almost all cases.

The small granular rods which resembled *Corynebacterium diphtheriae* in appearance and in colony morphology, in addition to growing very slowly on agar and in 5 per cent serum broth, showed no action on any of the test substances and were not pathogenic for guinea pigs.

A particularly interesting observation in connection with this work was the number of atypical forms present in the 24-hour broth cultures of some of the strains of streptococci. In preparations made from the sediment of these cultures for microscopic study, forms were found varying from minute, scarcely visible granules or cocci in chains, through chains of cocci of usual size and appearance, to greatly swollen or hypertrophied individuals and rod-like forms which in a few instances somewhat resembled bacilli. When these rod-like forms occurred on the end of the chain, they were sometimes club-shaped and granular. These hypertrophied forms frequently occurred together in chains of varying length, but the majority were short. When chains composed of these individuals alone were found, the cocci appeared to be pressed closely together in the form of discs with the long diameter transverse. In other cases, often in the same field or one closely adjacent, all of the different forms mentioned occurred in the same chain. These large atypical individuals are of interest, inasmuch as the impression is gained from observing a number of such preparations that they may be the predecessors of the orthodox form of streptococci. Proof of this relationship, however, can not be produced at present. Also in several of these preparations, these hypertrophied forms appear to have divided, at right angles to the usual plane of division, into two cocci of normal size. It would thus seem probable that in these strains

of streptococci, division can take place in two planes. Illustrations of these points appear in the Pickett Thomson monograph on streptococci and also in the work of Rosell.[36] All of the cultures, in which these forms have been found, were tested for purity by the usual means to exclude the possibility of the presence of contaminating bacilli or other organisms.

Discussion

In the first bacteriological examination of the milk samples from the 280 quarters, 21 failed to give any growth on the plates. Streptococci were present in 94 (33.3 per cent). Ten samples which failed to react to any of the tests were found to contain streptococci. On 56 plates streptococci alone were found. The flora of the rest of the plates consisted principally of micrococci in addition to which diphtheroids occurred on 10 per cent of the plates. In a few instances all three types of organisms were found in the same sample.

Of the 41 strains of streptococci tested, two could be classified as *S. bovis*, one as *S. mitis* and three appeared to be *S. fecalis*, but these may have been contaminants. The remainder gave characteristic reactions for *S. agalactiae* or *S. mastitidis*.

The micrococci which appeared on the plates varied in color from pure white to a deep yellow or orange color. The size of the colonies ranged from 1 to 4 mm after two days of incubation. The action on blood was variable. Many colonies, the yellow ones especially, were strongly hemolytic. Among these micrococci is one type whose colony formation on the surface of blood-agar may be mistaken for streptococci. The color of the colony is grayish white and the size on the original plate is approximately that of streptococci, especially when a large number of colonies are present. The chief point of differentiation between the two colonies appears when they are examined with a hand lens or a low dry objective. The surface of the micrococcus colony is somewhat dull when viewed by reflected light in contrast to the moist shining appearance of the streptococcus colony; also, the former has a slight central surface indentation. When examined with the oil-immersion objective of the microscope, the differences may be observed more or less readily by the appearance of the organisms in the colony.

Reference has been made to the occurrence of small granular rods in the milk samples. These organisms were cultivated from 23 samples in all. Bacteria of this type have been reported in aseptically drawn milk by several authors and have been men-

tioned as being the cause of mastitis by Sheather.[45] Although it seems evident that these organisms reside in the udder, the results of this investigation do not show that these organisms have any marked relationship to changes in the udder.

Although as great care as possible was used to prevent contamination of the milk samples while being drawn, some of them were contaminated. In two samples coliform bacteria were found and in several others spore-bearing bacilli were present. Likewise, the occurrence of *S. faecalis* and *S. bovis* in five samples adds some weight to this assumption. It is possible that any or all of these forms may be present in the udder in rather rare instances, but hardly in the numbers which have been found during this investigation. The natural supposition would be then that possibly the number of micrococci and other organisms occurring on the plates likewise do not all proceed from the interior of the udder. Many of these forms of micrococci are present on the teats, udder, skin and floor. Some work on this point was done in the course of this investigation.

Samples of the bacterial flora of the teats, udder, nose, mouth, flanks, vagina, rectum and feet, as well as the floor, were taken after the animal and the floor had been washed with water, by rubbing the area with sterile cotton swabs and then placing them in tubes of sterile 0.9 per cent salt solution, broth or milk. A small quantity of the sample then was spread upon the surface of 5 per cent blood-agar and Klimmer-agar plates.

About 40 samples of this kind were taken. The majority of plates were crowded with colonies of bacilli and micrococci similar in appearance to the type found in the milk samples. However, streptococci were present on about 12 plates, particularly from the vagina and rectum. The streptococci found belonged to the fecalis, bovis, lacticus and mitis group, and two strains isolated from the feet and inguinal region were classified as *S. pyogenes*. *S. agalactiae* was not recovered in any of these samples.

In order to test the possibilities of contamination in taking the milk samples, many plates of different kinds of agar and tubes of broth were exposed for one-half to one minute below the udder while the sample was being drawn. All the plates and tubes exposed were found to have growth. The organisms cultured in these plates and tubes were bacteria of the coli group, lactic bacteria, bacilli of the subtilis, proteus, mesentericus, cereus and mycoides groups; micrococci of types similar to those cultured

in the milk samples, and streptococci of the bovis, fecalis and viridans types and some actinomyces.

Pathogenicity

In order to test the pathogenicity of a few of the strains of streptococci obtained from the milk, 0.5 cc of a 24-hour broth culture was injected intraperitoneally and subcutaneously into mice and guinea pigs. To determine whether the pathogenicity could be increased by the use of testicular extract, another series of mice was injected intraperitoneally with 0.5 cc of culture and 0.5 cc of testicular extract. The suspension of testicular material was made by grinding the parenchymatous tissue, which had been taken aseptically from rat, cockerel and bull testes, in a sterile mortar with sterile 0.9 per cent salt solution. When a relatively fine emulsion was made, it was centrifuged and the supernatant fluid diluted with sufficient sterile salt solution to permit its injection with a 27-gauge needle. Several of the mice in each group died of peritonitis within two days after the injection and several others were visibly sick. It was not evident, therefore, whether any of these strains were pathogenic for mice intraperitoneally. None of the mice injected subcutaneously showed any reaction.

Guinea pigs also were inoculated subcutaneously with 1.5 cc of the same cultures alone and with 1.5 cc of testicular material and 1.5 cc of culture. There was no evidence of any reaction in the animals receiving the culture alone or 2 cc of the suspension of testicular material alone. In the pigs receiving both the culture and testicular material, there was an increase of three to four degrees in temperature for two succeeding days immediately after injection. The temperature then returned to normal. As a result of this test it would appear that the testicular extract had increased the activity of the strains of streptococci, as has been found with other bacteria and viruses.[8, 20]

Vaccination

Inasmuch as Rosell[35] has secured relatively good results in the treatment of mastitis with large doses of autogenous bacterin and protein (milk), together with frequent milking, 30 animals in the herd, which had been found to be diseased with the various tests, were vaccinated by this same method.

An autogenous bacterin was made by growing six strains of the streptococci found in the milk samples, in beef infusion bouillon to which was added 10 per cent liver-dextrose broth and

5 per cent bovine serum. To one-half of this medium was added 10 per cent infusion broth made from udder tissue alone. This step was taken to determine whether the addition of udder tissue might have any effect on the immunity produced. After incubation for two days, the flasks were tested for purity and 1 cc of formalin per liter of medium added. The flasks were tested for sterility after further incubation for 48 hours and no growth occurred. Half of the milk to be used in the vaccination was skimmed milk which had been held overnight in the refrigerator after 0.1 per cent formalin had been added. The other portion of the milk was taken from cows in the herd which were known to be carrying streptococci. One cc of formalin was added to one liter of this milk and the mixture allowed to stand for about an hour.

The 30 animals were divided into two groups, one of which received the bacterin prepared from organisms grown in bouillon containing udder-tissue broth, and the other received the usual bacterin. Each animal was given 50 cc of bacterin and 50 cc of milk at each injection. The injection was made in the gluteal muscles and three injections five days apart were given each animal. Only three animals showed any indication of a reaction and this occurred following the last vaccination.

Eight days after the last vaccination, 77 quarters were tested a second time to determine what effect, if any, had been produced. Although the time interval was somewhat shorter, Rosell[36] has found that marked improvement takes place within this period in many cases in Canada. Of the total number of quarters tested from 20 animals, three quarters were atrophied and not functioning at the time of the injections. Table I shows the status of these quarters on the second test, as compared to that of the first test:

TABLE I—*Status of quarters on second test.*

TEST	INCREASED	DECREASED	UNCHANGED	TEST NOT MADE
pH	20	17	40	
Catalase	29	37	5	6
Chlorin	16	49	5	7

These results show that only the chlorin test was affected to any extent by the vaccination. It has been pointed out before that the results of these tests may vary somewhat from day to

day. Therefore, to confirm these observations repeated tests should be made. Also, since many of these animals are now dry or rapidly approaching the end of the lactation period, it would be of interest to retest them after they have freshened.

A second bacteriological examination was made on 45 quarters which had been found to have streptococci on the first test. Thirteen of these quarters yielded the organism at this time but in 32 quarters streptococci could not be recovered from the milk which had been incubated over night. However, there is some evidence to show that streptococci can not always be cultivated on every attempt from quarters known to be harboring them. In order to determine whether this is an indication of definite improvement, it would be necessary to examine samples from these quarters repeatedly.

Summary

Samples of milk from each quarter of 70 cows have been examined for the presence of mastitis with several of the chemical and biological tests in use at the present time and also bacteriologically.

Of the 280 quarters tested, 232 (82.8 per cent) were found to be abnormal by one or more of the various methods used. On the basis of known past history of this herd and of the results found in this study, the type of mastitis appears to be of a chronic nature. No acute cases were found.

The number of quarters, of the 232 found to be diseased, were positive to the individual tests as follows: chlorin test, 192 (82.7 per cent); catalase test, 167 (72.6 per cent); brom thymol blue test, 69 (30 per cent); macroscopic and microscopic sediment test, 137 (59.5 per cent); palpation, 151 (65.6 per cent); black cloth test, 15 (6 per cent).

Streptococci were present in 94 (41 per cent) of the diseased quarters. They were present also in 10 (21 per cent) of the 48 quarters which failed to react to any of the tests, but in a second test many of these failed to show streptococci.

A limited study of milk samples taken from the same quarters a short time later has shown that the values found for the chlorin, catalase and brom thymol blue tests are not constant in all cases. In an examination of a herd to determine the extent of the mastitis, it is advised that more than one test be used and that the test be repeated at least once.

A method for applying the chlorin test in the stable is de-

scribed, which may be used in conjunction with the brom thymol blue test.

Forty-one strains of streptococci isolated during this work were tested. Two strains could be classified as *S. bovis*, one as *S. mitis*, and three as *S. faecalis*. It is believed that the presence of these six strains may possibly be due to outside contamination. The 35 other strains could be classified as *S. agalactiae (mastitidis)*.

The *S. agalactiae (mastitidis)* strains acidified, coagulated and partially reduced litmus milk in 48 hours at 37° C., did not change methylene blue milk in 24 hours (several strains caused slight reduction), fermented lactose (pH 4.4 to 4.6), saccharose and salicin. They did not act upon mannite, raffinose or inulin, did not liquefy gelatin and failed to reduce nitrates to nitrites. They were not hemolytic.

A few strains were tested for pathogenicity and neither mice nor guinea pigs were affected by 24-hour broth cultures when injected subcutaneously.

Micrococci both white and yellow were present in a majority of the samples. Diphtheroid rods occurred in about 10 per cent.

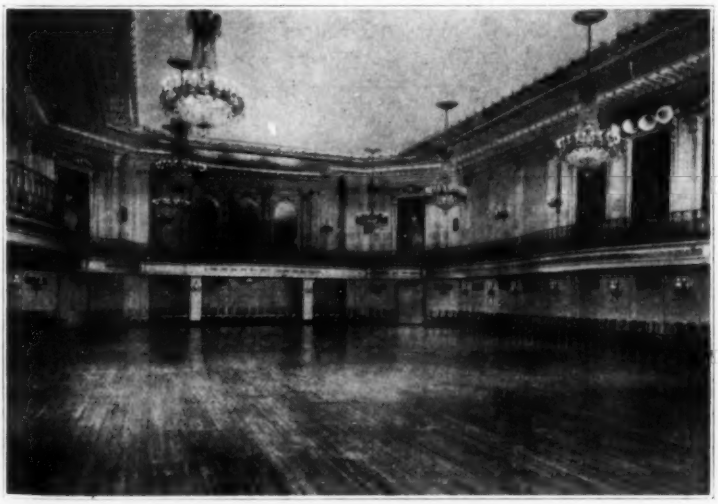
A short experiment was carried out to determine the varieties of streptococci present on the bodies and surroundings of the animals. No *S. agalactiae (mastitidis)* was recovered but *S. pyogenes, S. faecalis, S. bovis*, and *S. mitis* were present on many plates.

Thirty animals were given three injections of 50 cc of an autogenous bacterin and 50 cc of formalinized milk at five-day intervals. Sufficient time has not elapsed to determine the results of this treatment.

BIBLIOGRAPHY

[1]Baker, J. C., and Breed, R. S.: N. Y. Agr. Exp. Sta. Tech. Bul. 80 (1920).
[2]Baker, J. C., and Van Slyke, L. L.: N. Y. Agr. Exp. Sta. Tech. Bul. 71 (1919).
[3]Bergey, D. H.: Pa. Dept. Agr. Bul. 125 (1904).
[4]Bischoff, O.: Deut. Tierärzt. Wchnschr., xxxvii (1929), p. 147.
[5]Burr, A.: Molkerei-Ztg. Hildesheim, xl (1926), pp. 1337 and 1375.
[6]Doane, C. F.: Md. Agr. Exp. Sta. Bul. 102 (1905).
[7]Drost, J.: Z. Uhters. Nahrungsmitt., xlix (1925), p. 332.
[8]Duran-Reynals, F.: Jour. Exp. Med., 1 (1929), p. 327.
[9]Edwards, J. S.: Jour. Comp. Path. & Therap., xlv (1932), p. 43.
[10]Ehrlich, C.: Milchw. Ztg.-Stendal (1929), 28 and 28a. Cited by Seelemann, M.[44] (Not available in U. S.)
[11]Ernst, W.: Grundrisse der Milchhygiene. (2nd ed., Ferdinand Enke, Stuttgart, 1926.)
[12]Ibid: Monatsch. prakt. Tier., xx (1909), p. 414.
[13]Ibid: Monatsch. prakt. Tier., xxi (1910), p. 55.
[14]Gloy, H., and Bischoff, O.: Zeit. f. Fleisch. Milchhyg., xxxix (1929), p. 113.
[15]Gminder, A.: Cent. f. Bakt., 1 Orig., lxiii (1912), p. 152.
[16]Gressel, M., and Schönberg, F.: Berl. Tierärzt. Wchnschr., xlvi (1930), p. 75.
[17]Guillebeau, A., and Hess E.: Landw. Jahrb. d. Schweiz., v (1891), p. 30.
[18]Höyberg, H. M.: Zeit. f. Fleisch. Milchhyg., xxi (1911), p. 133.

[19]Hucker, G. J.: Proc. 24th Ann. Con. Intern. Asso. Milk Dealers (1932).
[20]Jones, F. S.: Jour. Exp. Med., xxviii (1918), p. 149.
[21]Klimmer, M.: Tierärztliche Milchkontrolle. (Richard Schoetz, Berlin, 1929.)
[22]Klimmer, M., and Haupt, H.: Cent. f. Bakt., 1 Orig., ci (1926), p. 126.
[23]Klimmer, M., Haupt, H., and Roots, E.: Cent. f. Bakt., 1 Orig., cvii (1928), p. 206.
[24]Koestler, G., Lehmann, W., Lörtscher, W., and Elser, G.: Landw. Jahrb. d. Schweiz., xl (1926), p. 290.
[25]Koller, R.: Wien. Tierärzt. Wchnschr., xvi (1929), pp. 201 and 261.
[26]Minett, F. C., Stableforth, A. W., and Edwards, J. S.: Jour. Comp. Path. and Therap., xlii (1929), p. 213.
[27]Nocard and Mollereau: Arch. Vet., ix (1884), p. 561.
[28]Ibid: Ann. de l'Inst. Past., i (1887), p. 109.
[29]Pijoan, M.: Jour. Exp. Med., liii (1931), p. 27.
[30]Prescott, S. C., and Breed, R. S.: Jour. Inf. Dis., vii (1910), p. 632.
[31]Pröscholdt, O.: Arch. f. Wiss. prakt. Tier., lviii (1929), p. 485.
[32]Roeder, G.: Milchw. Forschungn., vii (1929), p. 365.
[33]Ibid: Molkerei-Ztg. Hildesheim, xliv (1930), pp. 903 and 1119.
[34]Rosell, J. M.: Corn. Vet., xxi (1931), 1, p. 80.
[35]Ibid.: Corn. Vet., xxi (1931), 4, p. 317.
[36]Ibid: La Mammite Streptococcique de la vache. (Ministre de l'Agriculture de la Province de Quebec, 1932.)
[37]Rüdiger, M., Mayr, E., and Wurster, K.: Milchw. Forschungn., ix (1930), p. 472.
[38]Rühm, G.: Wchnschr. f. Tierheil. u. Tierzucht., lii (1908), pp. 125 and 147.
[39]Rullmann, W., and Trommsdorff, R.: Arch. f. Hyg., lix (1906), p. 224.
[40]Schönberg, F.: Berl. Tierärzt. Wchnschr., xlv (1929), p. 254.
[41]Schulze: Milchw. Cent., lvi (1927), p. 157.
[42]Seelemann, M.: Molkerei-Ztg. Hildesheim, xlii (1928), pp. 2809 and 2825.
[43]Ibid: Arch. f. Wiss. prakt. Tier., lviii (1928), p. 1.
[44]Ibid: Die Streptokokkeninfectionen des Euters. (M. & H. Schaper, Hanover, 1932.)
[45]Sheather, A. L.: Jour. Comp. Path. & Therap., xxxvii (1924), p. 227.
[46]Skar, O.: Zeit. Inf. Krhk. Haust., xxxiv (1928), p. 1.
[47]Slack, F. H.: Jour. Inf. Dis., supplement 2, (1906), p. 214.
[48]Storch: Abs. Jahresbr. d. Thierchem., xiv (1885), p. 170.
[49]Trommsdorff, R.: Münchner Med. Wchnschr., liii (1906), p. 541.
[50]Ibid.: Berl. Tierärzt. Wchnschr., (1909), p. 80.
[51]Zschokke, E.: Landw. Jahrb. d. Schweiz., vii (1893), p. 200.



GRAND BALL ROOM, PALMER HOUSE
Where general sessions of Chicago convention will be held. Will accommodate 2,500 persons.

EQUINE ENCEPHALOMYELITIS ANTISERUM*

By EDWARD RECORDS *and* LYMAN R. VAWTER

Nevada Agricultural Experiment Station
Reno, Nevada

In 1930, an extensive outbreak of encephalomyelitis occurred among horses and mules in central California. During 1931 and 1932, the disease recurred in California and by the end of the latter year had spread northward through Oregon and to the east and southeast into the Dakotas and Texas.

Descriptions of the disease and the causative filtrable virus already have been published by Haring, Howarth and Meyer,[1] Meyer, Haring and Howitt,[2, 3] and Howitt.[4] The matter of its spread, nature and some of the problems it presents also have been dealt with in the 1931 and 1932 reports of the Committee on Miscellaneous Transmissible Diseases of the United States Live Stock Sanitary Association.[5, 6]

The appearance of the disease in western Nevada in 1931, and its spread through that State in 1932, has afforded opportunity for its active study at this Station, which is still in progress. It was realized from the start that the ultimate control of this disease would rest on the prevention of its long-distance spread and transmission from animal to animal or active immunization or a combination of these methods.

Pending definite developments along the above lines, however, it was felt that an efficient antiserum for the treatment of individual cases and perhaps passive immunization would be of value. This provided that such a serum of reasonably high efficiency could be produced consistently and upon a reasonably sound economic basis. While somewhat doubtful as to this, work along this line was started in 1931.

The results to date have been on the whole so gratifying that it has been deemed warrantable to publish a method for the production of this serum for the benefit of those who may wish to prepare and use such a product. A detailed report covering the use of this serum and the results obtained to date will be given in another publication. No claim is made, of course, that the method has been perfected, and further improvement and refinements are to be expected. It is thought, however, that the procedure presented may be reasonably counted on to produce a reliable product at a cost which makes its general use practicable.

*Received for publication, December 20, 1932.

Virus Source

The virus used should have originated from acute, typical, uncomplicated cases of the disease in otherwise healthy animals. While probably preferable that it be of a fairly recent isolation, it should have had several serial passages through guinea pigs or horses before use in serum production.

Incident to these preliminary animal passages, the virus should have been passed through a Berkefeld N or equivalent filter, this filtration serving to free the virus from any bacterial contamination which might be carried along from the original case.

Though we have encountered no evidence of plurality of virus strains or failure of cross-immunization, the maintenance and use of several strains, preferably from different localities, is desirable.

Standard Virus

As the virus of this disease has not been cultivated definitely *in vitro*, it must be maintained and propagated in animal tissue, the brains of guinea pigs and horses being most practical for this purpose. Either animal may be used, but the horse is best suited for economical mass production.

Guinea pigs should be healthy vigorous stock not previously used for biologic work. A weight of from 300 to 400 grams seems most satisfactory; larger and older animals are apt to be refractory to infection and give uneven results. The guinea pigs are prepared for injection by removing the hair from the area bounded by the eyes and ears by a depilatory or close clipping. Light ether anesthesia is used both as a humane measure and to facilitate injection· it also markedly reduces the death loss from shock reaction at time of injection. The field of operation is swabbed with 1:1000 solution of bichlorid of mercury in 50 per cent alcohol. A 1- or 2-cc Record-type syringe with a $\frac{3}{16}$-inch, 18-gauge needle, having a very acute bevel, is used for injection. Puncture is made through the parietal suture of the skull and the dura into the median fissure between the two cerebri and 0.2 cc of standard virus emulsion (see below) injected.

Injection should be at medium speed to avoid shock and withdrawal of the needle delayed a few seconds to avoid leakage of virus emulsion. Care should be taken not to puncture or damage the actual brain tissue with the needle.

Temperatures and weights should be taken and recorded at least once a day, starting 48 hours after injection. A maximum rise to at least 104.5° F. should be obtained between 72 and 96 hours, with a weight loss of from 50 to 100 grams. Care should

be taken to exclude non-specific elevations of temperature due to environmental and handling conditions, to which the guinea pig is very susceptible. The inoculated animals must be watched very closely and destroyed by chloroform or illuminating gas as soon as complete paralysis develops. Animals which have been allowed to die a natural death cannot be relied on for satisfactory virus. The brain, including cerebrum, cerebellum and medulla, is removed in its entirety, with strict aseptic precautions, placed in two to three volumes of sterile half and half C.P. glycerin and Sorensen's phosphate buffer solution, pH 7.4,[7] and stored at 2 to 5° C.

Horses for virus production should be strictly healthy individuals as determined by history, careful veterinary examination and suitable tests for glanders. In districts where infectious anemia (swamp fever) exists, special care should be taken to exclude it. The Fulton bichlorid of mercury test[8,9] is helpful in this connection. We have not found that age, as such, influences susceptibility, a previous frank or occult attack of encephalomyelitis apparently being the only factor interfering with successful inoculation.

Even vicious or unbroken horses are readily inoculated in the standing position if a suitable technic is followed. The animals are confined in a suitable stock, shute or "squeeze," and given an intravenous injection of 8 to 12 cc of fluid extract of cannabis indica, depending on size and temperament; enough should be given to produce fairly deep narcosis but no tendency to fall. The forelock is removed and the head and neck sponged down with water or weak disinfectant solution. The central portion of the area bounded by the eyes and ears is shaved and mopped with a 1:1000 solution of bichlorid of mercury in 50 per cent alcohol.

The subcutis at the site of inoculation is infiltrated with about 3 to 4 cc of a solution containing 2 per cent novocain and 1:50,000 adrenalin. A perpendicular incision about one-half inch long is made in the skin and subcutis over the upper third of the parietal suture[10] of the skull. Then a hole is drilled through the parietal suture with a small, geared or ratchet drill equipped with a sterile $\frac{3}{32}$-inch bit.

Five to 8 cc of standard virus emulsion then is injected into the space between the two cerebri, using a 3-inch, 16-gauge, blunt needle. The minute superficial wound is daubed with tincture of iodin but no artificial closure or dressing is applied.

The inoculated horses must be kept under close observation, and temperatures should be taken twice daily. To be suitable

for virus use the animals should develop at least a fairly acute and typical attack of the disease, reaching the paralytic stage by the fifth to seventh day.

The progress of the disease usually is attended by three distinct phases: first, high temperature, 103 to 105° F., and depression occurring on the third or fourth day after inoculation; second, incoördination appearing about 24 hours after the peak of the temperature curve; third, collapse, prostration and motor paralysis at the fifth or sixth day.

As soon as the horse goes down and is definitely unable to rise from a flat prone position, it should be destroyed by shooting through the heart and bled out by severing the jugular and carotid at the base of the neck. The head with the upper quarter of the neck is removed and taken to a suitable place for removal of the brain. Immediately and with the most rigid aseptic precautions, the cerebrum, cerebellum and medulla are exposed, divided down the median line and each half placed in about two volumes of sterile half and half C.P. glycerin and Sorensen's phosphate buffer solution, pH 7.4.[7] Wide-mouthed, one-quart Mason jars make suitable containers for each half-brain unit. Storage is at 2 to 4° C. After removal of the head, a general autopsy should be performed as a final check on the horse's freedom from extraneous disease. Brains from horses which have died of, or been killed too late in, the disease are not reliable as a source of virus.

Standard Virus Emulsion

Virus-bearing brain tissue prepared and preserved as above should be held in storage for at least three to six days before use. This affords an opportunity for the glycerin solution to kill any surface-contaminating bacteria and, for some reason, not definitely determined as yet, greatly increases the potency of the virus. Brain virus stored as above will survive a long and variable time. It should be satisfactory for routine use for at least six to eight weeks.

To prepare what we have designated as standard virus emulsion, the whole or portions of two or more guinea pig brains, or fully representative portions of a horse brain or brains, are weighed out and ground to an impalpable paste in a sterile mortar with sand. This material is then diluted with physiological sodium chlorid solution, adjusted to pH 7.4, to a final strength of 2 per cent of brain tissue, calculated on a basis of brain by grams and salt solution by cubic centimeters. A quantity in excess of actual requirements is prepared.

This emulsion is then stored at 2 to 4° C. for two to three hours, and shaken occasionally during the first hour. This procedure apparently facilitates the "extraction" or "freeing" of the virus. During the short cold extraction period, the coarse particles settle out and the turbid supernatant fluid is carefully poured off or decanted and strained through a gauze pad to remove floating shreds of tissue.

This standard virus emulsion should, as a matter of routine, be used fresh, but storage for 24 to 48 hours at 2 to 4° C. apparently does not reduce its infective or antigenic properties materially.

Hyperimmunizing Horses

Horses for serum production should be perfectly healthy individuals as determined by careful veterinary examination and tests for glanders. Again, as in virus production, the exclusion of infectious anemia should receive special care. Attention should be given also to suitable conformation and tractability. The excessively "lymphatic" type, dapple greys and others usually considered unsuitable for general antiserum production had better be excluded. Horses which have survived intracranial inoculation for virus production may be used if otherwise suitable.

Horses of unknown status but presumably susceptible to infection may be given an initial dose of 1 cc intradermally, or 5 cc subcutaneously, of the standard virus emulsion. If normal at the end of ten days, serial doses of 25, 50, 100, 175 and 250 cc of standard virus emulsion may be given at ten-day intervals, all injections to be subcutaneous and not over 50 cc to be injected at any one point. Horses which have survived intracranial virus injection may be started at a 50-cc dosage.

Each lot of standard virus emulsion used for injecting horses should be check-tested at the same time, by injecting 0.2 cc intracranially into at least three guinea pigs.

While we have never had such an accident, horses which develop symptoms of the disease following the first or second dose of virus could probably be saved by serum treatment or if an acute attack develops, be destroyed and used for virus.

Test bleedings should be taken at the time the 175-cc and 250-cc doses are administered and the serum titrated as below. If the latter of these shows a satisfactory titre, the horse may be bled ten days after the 250-cc injection. Otherwise the 250-cc injection should be repeated at ten-day intervals until a satisfactory titre is obtained or the animal discarded as worthless for serum production. Doses in excess of 250 cc do not appear warranted or beneficial.

Once a satisfactory serum titre is obtained, it apparently can be maintained indefinitely by alternate 250-cc injections and bleedings at ten-day intervals and the horses be maintained in good physical condition. In case of emergency, an additional bleeding can be made after an interval of ten days, without an intervening virus injection. As in all antiserum production, the horses should be kept under close observation by a veterinarian and the standard injection and bleeding schedules varied to meet any untoward condition which may arise in the individual animal.

Serum Collection and Processing

The horses are bled from the jugular vein in the usual manner using the "closed" technique of trocar and tube to collection jars. Bleeding is according to the standard ratio of about 5 cc to one pound of weight; variations above or below this ratio being made if needful in accord with the individual horse's tolerance to bleeding. Any standard serum collection containers may be used. We use the regular battery-jar type with suspended weights. The weights are dropped at the end of 24 hours and the clear serum collected by aspiration at 48 hours.

Presumably any standard serum preservative may be used. We have used only the addition of 10 per cent by volume of a 5 per cent phenol solution in distilled water. If time permits, at least two weeks should elapse between the phenolization of the serum and further processing, the serum being stored meanwhile at 2 to 4° C.

The pooling of bleedings from several horses in each lot of serum is desirable, but unless the titre of each such bleeding is known it should be tested on guinea pigs, as below, before being added to the pool. This is to avoid reducing the potency of the pooled mixture by the inadvertent addition of a serum of low titre. Aerobic and anaerobic cultural tests on each individual bleeding before pooling also are desirable to exclude any possibly contaminated sera.

Simultaneous tests on guinea pigs of unfiltered and filtered portions of the same lot of serum have shown that Berkefeld filtration markedly reduced potency. It would appear, therefore, that as in the case of some other antisera such filtration should not be practiced.

We have always been able to clarify the serum satisfactorily by passage through four layers of Canton flannel in a large Buchner funnel. A disk of copper fly screen is placed in the funnel first, on this a disk of Canton flannel slightly larger than

the funnel diameter, the excess margin extending up the funnel sides to form a seal, then another fly screen disk and so on alternately until the desired number of flannel disks are in place. On top of the final flannel disk is placed a disk of ¼-inch-mesh hardware cloth or screen, to hold it in place. The whole assemblage of disks is held firmly in place by a truncated hard wood cone long enough to extend about one inch above the funnel rim. This cone is held under pressure by cords extending from the base of the funnel-stem up and over same, drawn tight and tied over the apex of the cone. This entire filter set-up is wrapped and sterilized after assembly.

Filtration usually is completed by gravity only, but a slight negative pressure from a vacuum pump connected to the receiving container may be used if the filter tends to choke as filtration progresses. After filtration, the serum is subjected to careful aerobic and anaerobic cultural tests and distributed into the final containers.

The elimination of Berkefeld filtration from the serum processing necessitates a very careful and aseptic technic throughout to insure a bacteriologically sterile final product. So far, however, we have encountered no failures along this line, all the serum produced having proven sterile in the final containers.

Serum Titration and Dosage

Several methods have been suggested and tried for titrating the anti-viral content or potency of this antiserum. For routine use, however, we recommend the following standard test. It is simple, direct and almost always gives clear-cut, easily interpreted results.

Healthy vigorous 300- to 400-gram guinea pigs are used, all those on a given test to be of uniform weight (within 25 grams).

Two pigs each are injected intraperitoneally with 4-, 2- and 1-cc doses of the serum under test. All the serum-treated pigs, plus three controls, are immediately given an intracranial injection of 0.2 cc of standard virus emulsion, using the technic described for producing standard virus.

The test pigs are kept under close observation and daily temperatures and weights are taken, starting at 48 hours. The results of the test, of course, will vary widely with the antibody content of the serum. In the case of what we would now class as a serum of satisfactory potency, the results should be about as follows:

The two pigs that received 4-cc doses of serum should show

little or no departure from normal, a slight temperature curve and weight loss, the latter rapidly regained being permissible.

The two pigs that received 2 cc of serum may show a fairly high temperature curve and some weight loss, with a rapid return to normal weight and condition. No incoördination or paralytic symptoms should be shown.

In the two pigs that received 1-cc doses the results naturally will be more variable, as this is usually a border-line dose. High temperatures, severe weight loss, with ultimate paralysis and death, are to be anticipated. These pigs, however, may survive and, in any event, life should be prolonged noticeably over that of the controls.

The three control pigs, that received virus only, should develop typical cases of the acute disease, of the experimental type, with high temperature curves, severe weight loss, paralysis, and death within four to six days.

While the ratio between virus and antibody units cannot be calculated with mathematical exactness on the basis of the above test, titration of the standard virus alone on guinea pigs indicates that the 0.2-cc dose used represents at least 200 m.l.d.

The matter of a proper dose of this serum for equines is still on a somewhat empirical basis and subject to later modification. For the time being we are recommending a 250-cc dose of serum of standard potency to be administered intravenously. One or two additional doses of 250 cc each, at 10- to 12-hour intervals, appear beneficial if there is some but not an entirely satisfactory response to the initial dose.

Remarks

The above outline is of necessity somewhat brief. We have attempted to stress and describe in fair detail special procedures inherent in the handling of this particular virus and the production and testing of this particular serum. No attempt has been made to describe in detail standard equipment and procedures incident to the routine production of antisera as a group. It is assumed that anyone undertaking the production of this product will, if not already trained and equipped along that line, secure the needful information relative to such standard procedures from other readily available sources.

Conclusions

1. We have presented what we believe to be a reasonably practical, proven and satisfactory method of producing and testing anti-equine encephalomyelitis serum at a moderate cost.

2. Of seven horses treated substantially in accord with this outline, only one has failed to respond to hyperimmunization satisfactorily.
3. No abscesses, loss of condition or deaths have occurred in the serum-producing horses which could be attributed to the hyperimmunizing and bleeding process *per se*.
4. The presence of equine anemia infection in the serum horses or their subsequent infection from horses used for virus production appears to be the biggest hazard in areas where this disease exists. This disease not only renders the infected serum horse useless but there is apparently grave danger of its dissemination by the finished serum if same is used shortly after production.
5. Work not covered in this paper indicates that anti-encephalomyelitis serum has marked value as a therapeutic agent. Given early in an attack, the death-rate is lowered, convalescence is shortened and the percentage of animals showing permanent damage is greatly reduced. Preliminary trials would indicate that its value for immunizing purposes is limited. Any passive immunity conferred appears at best slight and short-lived.

REFERENCES

[1]Haring, C. M., Howarth, J. A., and Meyer, K. F.: An infectious brain disease of horses and mules. Calif. Agr. Exp. Sta. Circ. 322 (1931).

[2]Meyer, K. F., Haring, C. M., and Howitt, B. F.: Newer knowledge of the neurotropic virus infections of the horse. Jour. A. V. M. A., lxxix (1931), n. s. 32 (3), pp. 376-389.

[3]Meyer, K. F., Haring, C. M., and Howitt, B. F.: The etiology of epizoötic encephalomyelitis of horses in the San Joaquin Valley, 1930. Sci., lxxiv (1931), 1913, pp. 227-228.

[4]Howitt, B. F.: Equine encephalomyelitis. Jour. Inf. Dis., li (1932), 3, pp. 493-510.

[5]Report of Committee on Miscellaneous Transmissible Diseases, U. S. Live Stock Sanitary Association. Jour. A. V. M. A., lxxx (1932), n. s. 33 (3), pp. 509-512.

[6]Report of Committee on Miscellaneous Transmissible Diseases, U. S. Live Stock Sanitary Association. Jour. A. V. M. A., lxxxii (1933), n. s. 35 (3), pp. 388-391.

[7]Hawk and Bergeim: Practical Physiological Chemistry. (10th ed., P. Blakiston's Son & Co., Philadelphia, 1931), p. 504.

[8]Fulton, J. S.: A preliminary report on a test for swamp fever. Jour. A. V. M. A., lxxvii (1930), n. s. 30 (1), pp. 58-61.

[9]Urbain, A., Vallée, M., Guillot, G., and Quentin, M.: Sur la réaction de Fulton appliquée au diagnostic de la typho-anémie des équides. Bul. de l'Acad. Vét. de France, iv (1931), 8, pp. 389-391.

[10]Sisson, S.: The Anatomy of the Domestic Animals. (W. B. Saunders Co., Philadelphia, 1914.) p. 74.

Over Fifty Years Ago

The amount of wealth represented by the poultry interest of the United States should compel all country practitioners to make careful studies and reports of the diseases of fowls.

American Veterinary Review, May, 1882.

HENRY JOHNSON DETMERS*
1833-1906
A Biographical Sketch and Character Study

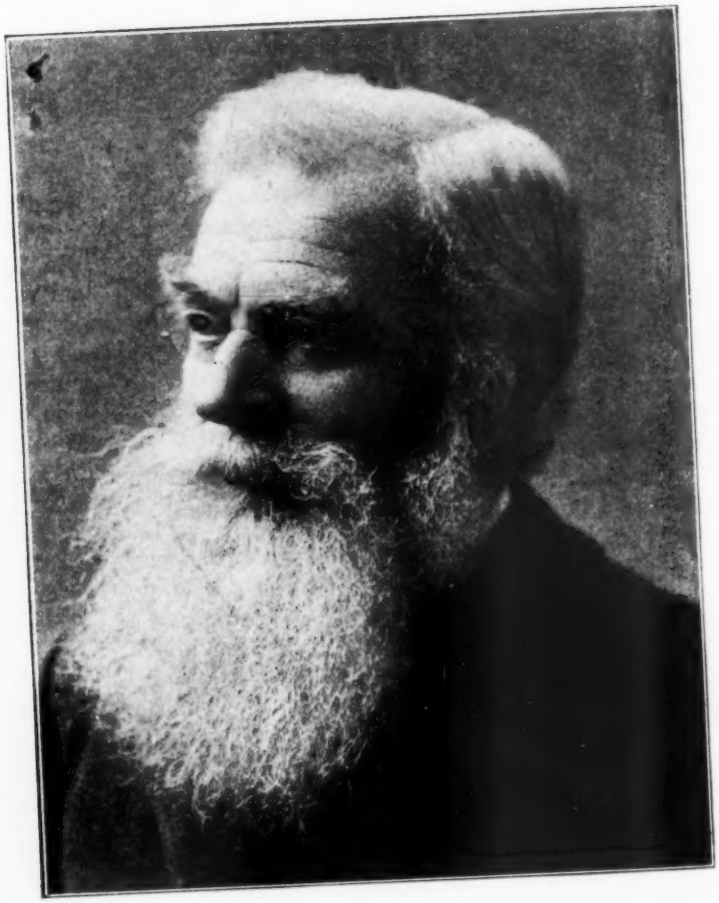
By FRITZ VOLKMAR, *Columbus, Ohio*
College of Veterinary Medicine, Ohio State University

At the present day, when veterinary education and research in the United States have scaled the foothills of progress, it seems worthwhile to pause for a brief space of time and look back to the valley from which the ascendency was gained.

The graduated veterinarians in this country, prior to 1867, were from European countries, excepting a few to whom veterinary diplomas were granted from agricultural colleges. The first graduated veterinarian to settle in the United States is said to have arrived in 1830. Up to that time, and for many decades afterward, the country as a whole was dependent upon, and evidently satisfied with, such veterinary service as could be had from horse-shoers, livery-stablemen, and shepherds. In a few instances the medical profession rendered such aid as it was able to give in a limited way. More frequently, charlatans of every description, made bold by their ignorance, usurped the title of cattle doctor or horse doctor and recklessly administered drugs. Their explanations of disease and their promises of cure were accepted by the farmers with astonishing credulity. They added misery to the suffering of their dumb patients and brought disrepute to the legitimate veterinary profession. There was no law to regulate veterinary practice and naturally this quackery flourished unrestrained, especially during the epoch following the Civil War. It swept the country like a wave. Needless to say that under such conditions epizoötics became rampant.

For lack of instituting and enforcing sanitary control measures, the farmers of the United States paid a yearly toll of millions of dollars on account of unchecked contagious animal diseases. In 1875, the annual loss of live stock from diseases was computed to be $100,000,000.00. It was then that the progressive citizens of the United States felt the need for trained veterinarians. In response to this demand, several veterinary schools sprang up during the closing quarter of the past century. The earlier colleges were private enterprises. Commercialism crept in and the result did not measure up to the most moderate expectations. As late as 1884, Billings, then Director of the patho-

*Received for publication, January 19, 1933.



H. J. Detmers

biologic laboratory at the University of Nebraska, could refer to the United States, as "a country where there are very few well educated veterinary surgeons, where there is no true value of veterinary science, a country where quacks and empirics of every form are nourished and appreciated before the well educated practitioner in only too many instances, where there is no official examination of the products from food-producing animals, where there are neither laws nor regulations for the suppressions of animal diseases, where there is no well organized veterinary school."

It was in this same year, 1884, that the Board of Trustees of the Ohio State University, realizing that a large proportion of the wealth of Ohio was invested in live stock, and sensing the necessity of its adequate protection, petitioned the legislature for the establishment of a first-rate veterinary school at the State University. This petition was duly granted and a chair of veterinary surgery was established in 1885. To this chair, Dr. H. J. Detmers was called.

Born in Oldenburg

Hinrich Janssen Detmers was born April 15, 1833, in the village of Stumpens, parish Wiarden, district Jever, in the northern part of the grand duchy of Oldenburg, Germany. He received instruction in the public school until he was thirteen years of age. Then he entered high school, which he attended four years. The boy had an inclination to study medicine, but at the request of his father—who was a farmer, and wanted his son to become a farmer too—he left high school and worked on various large farms for five years. While on the farm he became interested in live stock. He, therefore, decided to study veterinary medicine. In 1856, he matriculated at the Royal Veterinary College in Hannover, which at that time, due to the fame of the Drs. Guenther (father and son), was considered one of the best schools in Europe. The excellent training he received there formed the foundation for his successful career in this country. During the winter semester the curriculum included: natural history, 6 hours per week; anatomy, 15 hours; anatomical dissection, 12 hours; physics, 3 hours; clinic, 6 hours; horseshoeing (in sections), 6 hours. In the summer semester the courses taught were: general surgery, 6 hours per week; physiology, 3 hours; general pathology, 3 hours; chemistry and pharmacognosy, 6 hours; materia medica, 3 hours; prescription writing, 1 hour; botany, 5 hours; field trips, 6 hours; clinic and

operative practice, 9 hours; horseshoeing (in sections), 6 hours. In the following winter semester (third half-year) he studied anatomy 9 hours per week; special pathology and therapeutics, 9 hours; special surgery, 6 hours; postmortem technic, 6 hours; clinics and operative practice, 12 hours; horseshoeing (in sections), 6 hours. Policlinics and pharmacy laboratory were by arrangement. On Easter, 1858, he decided to change his alma mater. From the text of his ex-matriculation it appears that he had planned to go to Stuttgart, but evidently he changed his mind, for on April 15, 1858, we find him registered for three semesters at the Royal Veterinary College in Berlin, Germany. The remaining part of his college training must have comprised the following compulsory courses: Types and breeds of live stock, dietetics, dentition of animals, theory of horseshoeing, obstetrics, clinics and operative practice, postmortem technic, policlinic, ambulatory clinic, veterinary hygiene and veterinary law. During this period Detmers undoubtedly was thrown into contact with such leaders of veterinary thought as A. C. Gerlach, E. F. Gurlt, C. H. Hertwig and W. Spinola.

Comes to the United States

In 1859, Detmers passed the state examination in the grand duchy of Oldenburg, and received a first-class certificate. He practiced his profession for three years and then was called to the chair of stock breeding and veterinary science at the newly established agricultural college in Neuenburg. He remained there until 1865, when he emigrated with his family—he had married in 1854—to the United States. He practiced for a few years in Dixon and Quincy, Illinois. From 1869 to 1875, Detmers lectured in turn at the University of Illinois, University of Missouri, Iowa State College and Kansas State Agricultural College. He taught comparative anatomy, physiology and veterinary science and conducted clinics at these institutions. In 1878, U. S. Commissioner of Agriculture Wm. G. LeDuc appointed Detmers investigator of contagious and infectious diseases of live stock. The reports of his work in this service are published in the annual reports of the Commissioner of Agriculture. At the end of six years, he resigned this position to accept the call as Professor of Veterinary Science at the Ohio State University.

With keen intuition, Detmers felt that a great opportunity had come to him. He was eminently fitted for this position. By diligent study under renowned German veterinary teachers at

the schools of Hannover and Berlin, he had acquired a thorough training, the sum and substance of the accumulated knowledge of a century of European veterinary teaching and experience. This cultural background and his twenty years of veterinary service in this country qualified him well for the task of laying the foundation of a model veterinary college, which should become a leader of veterinary thought in North America, and which should send forth well educated and skilled veterinarians, who themselves might become leaders in their respective communities, and on whom the breeders and stock-raisers could depend for sound advice not only in cases of sporadic disease among their animals, but also when contagious and epizoötic diseases threatened.

Formulating the curriculum, he struck out with a clear vision for the needs confronting the State, and with the best interests of the future development of the profession in mind. He designed a thorough and complete course of instruction in veterinary medicine covering three years of professional work and requiring high school graduation for entrance. During these three years, all branches of veterinary science were taught in a most thorough manner, so that a student who passed his examination and was graduated at the completion of the full course was well informed and a competent veterinarian. Moreover, the graduate was at home not only in the common branches of veterinary anatomy and physiology, surgery, pathology, therapeutics, obstetrics, principles of horseshoeing, and others, but also in the just as essential auxiliary branches, such as chemistry, botany, histology, microscopy, pharmacy, the laws of hygiene, the laws of breeding, forensic veterinary medicine, food inspection and others.

Classes in Helminthology and Bacteriology

In 1886, Detmers organized a class in helminthology. In 1887, he added bacteriology to the curriculum. These courses, which form perhaps the earliest presentation of these subjects to veterinary students in this country, are significant for the range of instruction offered at the Ohio State University. From 1888 till 1895, Detmers had assistant lecturers to help carry part of the load of strictly professional teaching. During the earlier years his teaching required of his time between 17 and 26 week hours per term. His later teaching load varied between 11 and 16 week hours per term. In 1895, after ten years of teaching, when he had put the veterinary college on a firm and solid founda-

tion, Detmers resigned and severed his connection with the University. He engaged in private practice and continued his researches into hog cholera. Antedating and anticipating the work of Dorset, Niles and McBryde, Detmers successfully employed anti-hog cholera serum which he manufactured on a fairly large scale for protective vaccination. In 1900, he devised an improvement in the construction of a hypodermic syringe that permitted the instrument to be sterilized without damage to the plunger. He secured a patent on this device. This syringe, with slight alteration, is still in use today. Detmers died on December 11, 1906, in Columbus, Ohio. His wife had preceded him in death almost exactly one year. One of their four children, a daughter, distinguished herself in botanical research. In 1920, the Ohio State Veterinary Medical Association honored the memory of Dr. Detmers by presenting a life-size oil portrait of this pioneer veterinarian to the Saddle and Sirloin Club of Chicago, to be placed in its portrait gallery.

Dr. Detmers possessed a medium stature. His face with the high forehead was well proportioned and well chiseled. Beneath bushy brows his expressive eyes bespoke his alertness of mind. People who met him in conversation were impressed with his fine mental poise. When he appeared in the street he attracted attention easily by his manly stride and his dignified bearing. His thick beard made him a conspicuous figure on the campus.

Many Fine Traits of Character

While Detmers brought with him the heritage of his ancestors, the virtues of his native country—integrity, a sense of duty, indefatigable industry, and an unconquerable will—he joined to these attributes, by the process of Americanization, all that is noble in the American character, above all, a high idealism and a wealth of inspiration. Detmers developed great independence in his actions and could not easily be swerved from his viewpoint. His impulsiveness brought him at times into friction with opposing views. Whatever work he undertook, he discharged his duties with such distinction that he challenged the respect of all those whose good opinion was worth having.

In a large measure Detmers had the qualifications of the scientific mood. He was always a seeker after truth. He was greatly fascinated by the possibilities of bacteriology in veterinary research, and was quick to apply this new science in his study of the epizoötic diseases which then prevailed in this country and were decimating the live stock population on the

farms. If, in his investigations, he strayed into blind alleys, committing errors called forth by the shortcomings of the bacteriological methods of his day, what does it matter? His reports to the government stood out above any other veterinary contribution of his time as classic, because his method of research was inherently sound. He was not satisfied with the *status quo* of his education. Every few years he would spend a summer in Germany and return to college in September, bringing with him the very latest ideas he had gained from his visits with Koch and Ehrlich. He would tell his students what he had seen and heard in Europe. As most of this had not appeared in print, certain members of the University considered him visionary and impractical. However, he was greatly respected for his scholarship and learning and was regarded as an outstanding member of the University faculty. As a matter of fact, Detmers was correct in his ideas and views. He was merely ahead of his time in America.

Advocates Longer Veterinary Curriculum

Remarkable also was Detmers' courage of steadfast endurance. This is seen not only in the tenacity with which he pursued his scientific inquiries but also in his uncompromising devotion to the needs for the normal development of the newly founded veterinary school. He had the vision before him that if the newly established veterinary school was to fulfill its mission, it had to be on a level with the best medical schools, which, indeed, was the level of his school at the time. It should be remembered that the average medical school in those days maintained only a two-year curriculum. Detmers insisted on quality rather than quantity in the admission and graduation of his students and he clung to that ideal tenaciously in the face of growing opposition to his lofty ideals. Already he had been advocating the lengthening of the curriculum from a three-year course to a four-year course. Thanks to his perseverance, a high standard of training was maintained during his tenure of office. During the last few years of his administration, students lacking the required points for high school graduation could be admitted to the veterinary college upon special entrance examination. This new standard was maintained until 1914, when high school graduation for admittance was enforced again.

It is seen from this that his main interest was not only to raise the veterinary profession to a higher plane, but also to elevate the popular notion of what a veterinary education ought

to be. In this he rendered the profession a service of far-reaching importance.

Finding the private schools then in existence inadequate and wanting, he was not content to permit faulty institutions to remain as they were, but went ahead with his own ideas about veterinary education, and by example showed the road to a higher goal. In 1885, when becoming a member of the Ohio State Veterinary Medical Association, he declared before that body that he thought the veterinary profession in Ohio ranked with that of any other state, but that it had not attained that place of honorable distinction to which it was entitled. He recalled that twenty years before, when he landed in this country, he felt ashamed to claim the title of veterinary surgeon. He rejoiced that those days had gone by, that the masses had begun to understand what the title meant and that the profession ranked amongst other professions as it rightfully should. He regretted that most of the American veterinary colleges were private enterprises, when, in his opinion, they should be state institutions.

Always Ready to Serve

We have seen that Detmers lived at a time when animal plagues made fatal inroads into the live stock populations of American farms. His exceptional professional training and his personal qualities made him the man of the hour. When LeDuc, Commissioner of Agriculture, was implored by the frantic farmers for help, it was not surprising that he should call upon Detmers to investigate the diseases of live stock. When the enlightened people of Ohio, dissatisfied with the existing veterinary service, clamored for better trained veterinarians, it was natural that the Board of Trustees of the Ohio State University, impressed by the ability of this scholarly veterinarian, should call upon Detmers to organize a veterinary college. Thus, when the hour came, when opportunity beckoned, it found Detmers ready to answer her call and to serve his adopted country well. Ralph Waldo Emerson has said to the effect that a great man does not wake up on some fine morning and say: "I'm full of life. I'll go out and found a new college" or "I'll ransack botany and find a new cure for disease" or "Today I'll go to the dissecting-room and discover a new bacterium." No, but he finds himself in the river of thoughts and events, forced onward by the ideas and necessities of his contemporaries. He stands where the eyes of all men look one way and their hands all point in the direction in which he should go.

It is not saying too much to state that in his time Detmers ranked foremost among the veterinary educators in the United States. Detmers was a moulder of character in man. He had the rare ability to imbue his students with enthusiasm for research and to implant in them an earnest desire for exactness, neatness and detail. His own industry and sincerity were contagious. They inspired his students to zealous efforts. Dr. Detmers prepared his lectures carefully and in a scholarly way. His teaching, therefore, was always elucidating and precise. To evaluate the quality of his teaching, it may suffice to recall that, in 1887, a senior student in his class in bacteriology became enabled to undertake successfully as his thesis an original investigation into the causes of foot-rot in sheep. This thesis was read before the American Society of Microscopists at the meeting held in Pittsburgh, Pennsylvania, September 1, 1887, and met with high praise not only from the members of the Society, but also from the medical and secular press. *The Saint Louis Medical and Surgical Journal*, which is considered an authority on microscopy, referred to this thesis, in an editorial in its October number, as "a paper of great value on the bacteriological origin of foot-rot in sheep . . . marked by a thoroughness of research and a neatness and beauty of experimentation of the highest order."

First Graduate Mark Francis

The first student to be graduated under Detmers was Mark Francis ('87), now one of the most distinguished veterinarians in the United States, a man whom all Texas honors on account of the great public service he rendered that State, and of whom Dr. Thompson, President emeritus of the Ohio State University, is said to have remarked that if the Ohio State University had done nothing else except give Dr. Francis to the world of today, her mission had been worthwhile.

Dr. David S. White, another one of Dr. Detmers' pupils, attained eminence in the veterinary profession as Dean of the College of Veterinary Medicine, Ohio State University. Dr. Paul Fischer, erstwhile student and later lecturer under Professor Detmers, distinguished himself as the ablest state veterinarian of his day, compelling for his administration the admiration of the profession and laity alike. Finally, Dr. Charles Morrey, Chairman of the Department of Bacteriology at the Ohio State University, traces his enthusiasm for microbiology back to the inspiration received from Detmers while a student

in his class in bacteriology. As a matter of fact, all of Detmers' pupils were able to fill positions of responsibility and trust.

Today, when the Ohio State University Veterinary College, mindful of its leadership, is preparing to raise its standard for admission and for education to yet higher levels, we realize that Detmers' influence is still alive. Inquiring into the vitality of his influence we find this truth applicable to Detmers: It is not the calling or station in life that gives dignity or nobility to a man, but it is the man that dignifies the station or the calling.

ACKNOWLEDGMENTS

The writer acknowledges his indebtedness to Dr. Freda Detmers, University of Southern California; Dr. J. D. Foster, Minneapolis, Minnesota; Dr. Mark Francis, Texas A. and M. College, College Station, Texas; Dr. Adolf Köser, Veterinary College, Hannover, Germany, and Dr. Wilhelm Rieck, Veterinary College, Berlin, Germany, for information.

LITERATURE CONSULTED

Ann. Rpts. of Board of Trustees, Ohio State Univ., 15th Ann. Rpt., 1885 (1886), to 25th Ann. Rpt., 1895 (1896).

Ohio State Veterinary Medical Association (Rpt. of Ann. Meet.) Amer. Vet. Rev., ix (1886), p. 522.

Rpt. of the Veterinarian, from Ann. Rpts. of Ohio Agr. Exp. Sta. 7th Ann. Rpt., 1888 (1889), to 9th Ann. Rpt., 1890 (1891).

Morrey, C.: Early instructors in bacteriology in the United States. Jour. Bact., iii (1918), p. 308.

Fischer, P.: Dr. H. J. Detmers. Ohio State Univ. Vet. Alum. Quar., vi (1919), pp. 217-219.

Wentworth, E. N.: A Biographical Catalog of the Portrait Gallery, Union Stock Yards, Chicago (1920).

Cope: History of the Ohio State University, i (1920), pp. 492-493.

Hooper: History of the Ohio State University, ii (1926), pp. 108-109.

Pammel, L. H.: Prominent men I have met: Dr. H. J. Detmers. Ames, Iowa, Daily Tribune and Evening Times (April 23 and 30, 1927.)

California Physicians and Veterinarians to Meet

The April meeting of the Southern California Veterinary Medical Association will be a joint affair with the Hollywood Academy of Medicine. There will be a banquet in connection with the meeting, which will be held at the Roosevelt Hotel at 6:30 o'clock, Thursday evening, April 20. Dr. Karl F. Meyer, of the Hooper Foundation, San Francisco, will be the speaker of the evening and his subject has been announced as: "Disease Akin to Man and Animals." Dr. T. G. Beard, secretary of the Association, states that this meeting will be the first occasion of its kind in the state of California. There should be more meetings of physicians and veterinarians.

TRANSMISSION OF EXPERIMENTAL RABIES FROM MOTHER TO YOUNG*

By J. E. SCHNEIDER *and* B. J. MCGROARTY
Mulford Biological Laboratories, Sharp and Dohme
Glenolden, Pennsylvania

On February 10, 1932, a sheep was injected subdurally with 0.2 cc of fixed rabies virus. Two days later, the sheep gave birth to an apparently normal lamb. The sheep died of rabies on February 16, the sixth day after injection, having nursed the lamb four days. The lamb then was fed on the bottle until the morning of February 24, twelve days after birth, at which time it showed well pronounced symptoms of rabies.

The brain of the lamb was emulsified with normal salt solution to contain 20 per cent brain tissue and a 0.2-cc dose was injected subdurally into two rabbits. Both rabbits died of rabies in seven days.

CANINE COCCIDIOSIS DUE TO EIMERIA CANIS†

By L. V. SKIDMORE *and* C. B. MCGRATH
Department of Animal Pathology and Hygiene
University of Nebraska, Lincoln, Nebraska

Hall,[1] and Hall and Wigdor[2] described canine coccidiosis due to *Diplospora bigemina*. Their nomenclature was based on the writings of Stiles (1892) and Fantham (1916). Wenyon,[3] commenting on the work of Hall and Wigdor, concluded that the coccidia observed by these workers in dogs in Michigan appears to be *Isospora rivolta* (the smaller), and *I. felis* (the larger). The name of *I. felis* was proposed by Wenyon in 1923.[4] Present writings report the genus Isospora (Aimé Schneider 1875) as

*Received for publication, December 23, 1932.
†Received for publication, January 23, 1933.

the common species of coccidia found in canines, three distinct species of which have been described in the literature. On the other hand, there are very few reports of the finding of coccidia, belonging to the genus Eimeria, in dogs. Nöller[5] states that Eimeria are scarce in the dog. Brown and Stammers, in 1922,[6] recorded the findings of Eimeria in the feces of canines in London and, in 1923,[4] Wenyon described this species. Nieschulz[7] recorded the finding of *E. canis* Wenyon in a dog in Holland. Marotel[8] mentions *E. canis* under the heading, "Coccidies rares, douteuses ou peu connues." Because of these few reports and the failure to find in available American literature any mention of *Eimeria canis* having been found in canines in this country, the authors were prompted to record their findings. Perhaps coccidia belonging to the genus Eimeria would be found more often in dogs if the practice of sporulating the intestinal contents of these animals were carried out.

The Infected Canine

On June 21, 1932, a three-month-old Boston terrier from a kennel was brought to Dr. J. E. Weinman, of Lincoln, Nebraska, for examination. This animal had a history of irregular eating, occasional vomiting, stools slightly thin and general unthriftiness. There was some question as to the possibility of this dog being affected with distemper. However, it did not receive a protective inoculation against this disease until the middle of November, 1932. Dr. Weinman noted the presence of coccidia in the feces of this terrier but was unable to identify the species present. Treatment consisted of administering, three times daily for a period of two weeks, No. 00 capsules containing a mixture of powdered triple arsenite tablets, gentian, sodium bicarbonate and bismuth subgallate. Recovery was rapid and uneventful.

Description of the Coccidia

The feces from this canine were submitted to our laboratory for examination.[9] In this material were found oöcysts of a yellowish-brown color, ellipsoidal in shape, with the protoplasm well contracted in a circular mass occupying one-third to one-half the inside area of the coccidium. Upon first examination only one coccidium was seen with a micropyle. Thirty-five oöcysts were measured. The largest measured 33.75μ x 18.75μ; the smallest was 24.37μ x 16.87μ. The average size was 28.75μ x 16.23μ. The wall is 0.75 to 1.0μ thick. The average form index 0.56.

Development of the Coccidia

Feces containing oöcysts was put into a 2 per cent solution of potassium bichromate, broken up and strained through a gauze cloth. This allowed the coccidia to develop for further study. Within 19 hours, four sporocysts had developed in some of the coccidia. At the end of 24 hours two sporozoites could be seen in some of the sporocysts. The sporocysts when first observed were spherical in shape, later they became ovoid and finally elongated, wide at one end and pointed at the other. Each sporocyst contained residual material. The large sporocyst measured 12.18μ x 7.50μ; and the smallest 6.64μ x 6.64μ. The average size of fifteen sporocysts measured was 9.35μ x 7.26μ. The largest sporozoite measured 10.79μ x 2.49μ; the smallest was 8.30μ x 2.49μ. The average of the ten sporozoites measured was 9.47μ x 2.49μ. There is a granular residual body in the ripe sporulated oöcyst. The red or pink color of the oöcysts mentioned by Wenyon was not observed by the writers. By throwing the field under observation somewhat out of focus, a pink or red ring could be seen around the coccidia but this was due to refraction of light.

Measurements in microns of Eimeria found in canines by different observers:

Reported by	*Year*	*Oöcysts*	*Sporocysts*
Wenyon	1923	18-45 x 11-28	
Nieschulz	1924	17-32 x 12-20	
Skidmore and McGrath	1932	24-33.75 x 16-18.75	6-12.18 x 6-7.5

Conclusion

We believe the coccidia found by us to be *Eimeria canis* Wenyon as described by Wenyon in 1923 and Nieschulz in 1924.

References

[1]Hall, M. C.: Parasites of the dog in Michigan. Jour. A. V. M. A., li (1917), n. s. 4 (3), pp. 383-396.
[2]Hall, M. C., and Wigdor, M.: Canine coccidiosis, with a note regarding other protozoan parasites from the dog. Jour. A. V. M. A., liii (1918), n. s. 6 (1), pp. 64-76.
[3]Wenyon, C. M.: Coccidiosis of cats and dogs and the status of the Isospora of man. Abst., Jour. A. V. M. A., lxv (1924), n. s. 18 (4), pp. 496-497.
[4]Wenyon, C. M.: Protozoölogy. A Manual for Medical Men, Veterinarians and Zoölogists. (Baillière, Tindall & Cox, London, 1926, ii, pp. 846-847.)
[5]Nöller, W.: Kokzidien bzw. Coccidien (Coccidia) und die Erkrankungen durch Coccidien (Coccidiosis) Tierheilkunde und Tierzucht. Ein Enzyklopädie der praktischen Nutztierkunde. Stang und Wirth. (Urban und Schwarzenberg, Berlin and Vienna, 1929, vi, pp. 174-200.)
[6]Brown, H. C., Stammers, G. E. F. (and Balfour, A.): Observations on canine faeces on London pavements. Lancet (Dec. 2, 1922), pp. 1165-1167.
[7]Nieschulz, O.: Ein weiterer Fall von Eimeria canis Wenyon. Berl. Tierärzt. Wchnschr., xl (1924), pp. 220-221.
[8]Narotel, G.: Parasitoiogie Vétérinaire. Parasites et Maladies Parasitaries des Animaux. (Baillière et Fils, Paris, 1927, p. 436.)
[9]Benbrook, E. A.: Fecal examination of evidence of parasitism in domestic animals. Vet. Pract. Bul., ix (1929), 1.

A METHOD OF PRESERVING ACTINOMYCES BOVIS IN ITS "RAY FUNGUS" FORM*

By I. A. MERCHANT, *Ames, Iowa*
Department of Veterinary Hygiene
Iowa State College

Microscopic diagnosis of actinomycosis which is caused by *Actinomyces bovis* is based upon the demonstration of the stellate arrangement of the club-like parts of the microörganism in unstained purulent or caseous exudate from the infected animal. Therefore, it is necessary for students in veterinary medicine, and others who may be called upon to diagnose this condition by microscopic examinations, to be acquainted with this shape of the microörganism. The demonstration of this morphologic

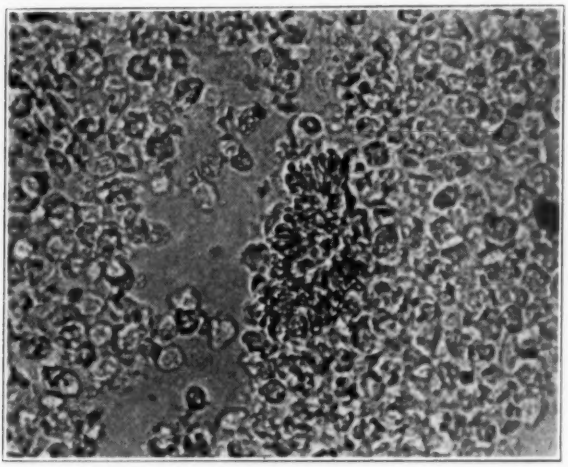


FIG. 1. *Actinomyces bovis*, unstained (x 410).

characteristic of *Actinomyces bovis* in pathogenic bacteriology is often impossible, due to lack of material. Although cases of actinomycosis are prevalent in parts of the country where cattle are numerous, it is rather difficult to secure material when needed. For example, it has been observed here that cases of the disease did not appear at the veterinary clinic when the class in bacteriology was studying this particular microörganism. If the actinomycotic exudate could be collected and preserved, it

*Received for publication, January 26, 1933.

would be available for class use when desired. An attempt was made, therefore, to find an adequate preserving vehicle for the exudate containing the microörganisms.

The preservative value of syrup is well known. It was found that the best preservative for this purpose is a concentrated sugar solution. The solution described below was used because it was present in the laboratory, being employed in the routine detection of parasite ova in feces. It is probable that a more concentrated or a less concentrated sugar solution than the one given below may serve just as well.

The sugar solution is prepared by dissolving 1 pound of granulated sugar in 12 ounces of distilled water. By immersing a bottle containing the ingredients in hot water, solution is hastened. Add 1 per cent phenol as a preservative.

Equal parts of exudate from the actinomycotic lesion and sugar solution are thoroughly mixed. The mixture is placed in a bottle which can be sealed tightly.

The microörganisms in the exudate which has been preserved by this method, and kept at room temperature for four years, appear like those present in fresh exudate. Figure 1 (photograph by Dr. E. A. Benbrook) demonstrates the "ray fungus" shape of *Actinomyces bovis*, which has been preserved for four years in sugar solution.

THE DEFENSE MECHANISM IN A CASE OF TRAUMATIC PERICARDITIS IN A COW*

By J. F. WITTER, *Orono, Maine*
Department of Animal Industry
University of Maine

Subject: A Holstein cow, aged 6½ years.

History: During the past year, the cow occasionally showed inappetence for short intervals. She has had an excellent breeding record and has been a consistently good producer. On January 2, 1933, she calved and cleaned normally and showed no evidence of udder trouble. Within the following eight days, however, she showed marked inappetence and some depression. An examination on January 10 revealed that her genital organs were apparently in good condition.

At this time she showed great depression and was thin and

*Received for publication March 1, 1933.

weak. Her respiration rate was about normal. The pulse was firm and the rate 95. Temperature, 103° F. Auscultation indicated no abnormalities except the rapidity of the beats. There was a constant twitching or shivering in the axillary region just behind the elbow. Tactile percussion of this area gave no unusual response. A tentative diagnosis was made at this time of traumatic gastritis complicated by traumatic pericarditis. A strychnin stimulant was prescribed.

Within the next week the cow's appetite improved, but she showed a vaginal discharge, which proved to be from a mild case of pyometra. The uterus was drained and douched twice and

FIG. 1. Right side of heart showing pericardium from cow with traumatic pericarditis. (A) Wire which produced the trouble. Note thickness of pericardium and roughened surface of the epicardium.

the discharge discontinued. The temperature during this time was around 103° F. The animal became weaker during and following the genital trouble and an edematous swelling developed in the region of the brisket. On February 3 she died.

AUTOPSY

Uterus: Endometrium is mildly inflamed but there is no exudate present. The organ is in about the normal state of involution. The muscular wall of the organ is greatly impaired and a few necrotic foci suggest that some of the uterine exudate escaped through the wall. A generalized peritonitis surrounds the uterus, as indicated by the numerous adhesions. A few

small encapsulated areas are found in these adhesions, some of which contain a sero-fibrinous exudate and others purulent exudate.

Liver: The organ as a whole shows cloudy swelling. There are large areas of fibrinous peritonitis involving the capsule.

Adhesions: The reticulum is adhered to the diaphragm. The diaphragm in turn is adhered to the pericardium.

Lungs: There are no marked changes except a localized abscess about 6 cm in diameter in the left lobe.

Pericardium: The lungs are greatly compressed by the enormous distention of the pericardium. Incision of this sac liberates at least three gallons of dark-brown, foul-smelling, purulent

FIG. 2. Cross section of the left wall of the heart. (A) Layer of fibrous tissue replacing the epicardium.

fluid. The pericardium is greatly thickened, measuring 0.5 cm, and its pleural surface is adherent to the sternal wall. In the region where the pericardium is adherent to the diaphragm, a piece of hay-baling wire has pierced the tissue, as illustrated in figure 1, and continues back through the diaphragm into the reticulum. This wire has been disintegrated by the body fluids until it is about one-half its original thickness.

Heart: The epicardium is pale in color, its surface is remarkably roughened, and it has attained the unusual thickness of 1 cm, as is illustrated. The endocardium showed no marked

changes except that the chorda tendineae and valves are slightly thickened and the tricuspid valve shows a small hemorrhage.

Brisket: An edematous infiltration of the fat and subcutaneous tissue apparently produced the swelling observed a few days before death.

Histopathology

Liver: This organ shows diffuse passive congestion and cloudy swelling, with marked fatty degeneration and pyknosis around the central veins. There is considerable induration around the bile-ducts, hepatic artery and portal vein. The capsule is greatly thickened by the proliferation of fibrous tissue.

Pericardium: Measures 0.5 cm in thickness. The pleural layer has been displaced entirely by a dense fibrous connective tissue which is marked by its unusual vascularity. Toward the inner surface of the sac, the tissue becomes less dense and is interspersed with cells of the histocytic type. These histocytes and fibrocytes extend to the area of necrosis. This necrotic margin, 1 mm in width, lines the inner surface. There are no polymorphonuclears present.

Epicardium: One cm in thickness. The serous epithelium has been destroyed by a superficial necrosis of about 1 mm in thickness. Beneath this necrotic tissue is a band of histocytes and fibrocytes. The fibrous tissue becomes more dense next to the myocardium and includes numerous lymph-vessels.

Myocardium: This shows no changes except an edematous infiltration between the fibres.

Remarks

This is a chronic case of traumatic pericarditis, probably close to a year in duration, as is indicated by the history and the pathological findings. During this time the subject became pregnant, gave birth to a normal calf, and gave a moderate quantity of milk up to three days prior to death. It is truly remarkable that an animal's defense mechanism can successfully wall-off several gallons of purulent fluid around such a vital organ as the heart and not show more systemic injury than was noted in this case. Probably only rarely is the heart observed to function when injury has been so prolonged as to cause the organ to be encapsulated in a wall of defense tissue a full centimeter in thickness, including a superficial layer of necrosis 1 mm thick. However, the defense mechanism was evidently at the limit of its capacity.

as evidenced by the rapid disintegration of the uterine wall following a relatively mild metritis.

ACKNOWLEDGMENT

The author expresses his appreciation to Mr. Cecil Ogden, who supplied the photographs used with this report.

Shannon Committee Reports

The report of the special committee of the House of Representatives appointed to investigate government competition with private enterprise, pursuant to House Resolution 235, was presented by Honorable Joseph B. Shannon, Chairman, on February 8, 1933, and ordered printed. The document appears as House Report No. 1985, and consists of 253 pages. The following paragraphs, taken from one part of the report, will be of interest to veterinarians:

> Veterinarians protest against the abuses and unfair practices of the agricultural extension workers, who they claim are violating the law, and interfering with legitimate veterinary practice in the sale and handling of serum and virus and other biologics and pharmaceuticals.
>
> The veterinarian spends from four to five years studying all branches of medicine to qualify him properly for the practice of his profession, and in many instances county agents and extension workers who are totally untrained and uneducated in these subjects are competing with him in the vaccination of animals.
>
> In view of the fact that approximately 85 per cent of the grain products in the United States are marketed through livestock, the veterinarians claim that it is most essential that a healthy situation be maintained in that field.
>
> Evidence of the importance of achieving the control of livestock disease is witnessed by the fact that veterinary colleges are maintained in every important livestock country in the world at public expense, and it is pointed out that with the possible exception of Great Britain, these colleges are supported by Government funds.
>
> One of the most important contributing factors to the collapse of the 5-year plan in agricultural production in Soviet Russia is attributed to the failure to provide adequate veterinary service, resulting in the loss of animals from disease.
>
> The Federal director of the agricultural extension service in the United States has frankly admitted that his authority over county agents is very limited. He is authorized to advise extension directors, but his department in Washington has no authority to issue orders as to the activities of county agents. In other words, while the Federal Government is spending millions of dollars annually for this service, it has no control over the men who receive this money.

The membership of the A. V. M. A. passed the 1,000 mark at the meeting held in Chicago in 1909.

MILCHKUNDE. (Milk Science.) M. Klimmer. 212 pages, 42 figures and 3 colored plates. Richard Schoetz, Berlin, 1932. Bound, 12 RM.

This is a revision and augmentation of a former edition entitled, "Tierärztliche Milchkontrolle," published in 1929. It is intended for use as a handbook for veterinary practitioners, official veterinarians, milk hygienists, students of animal health and medicine, food chemists, dairy farmers and dairy plant operators. It is especially useful in enforcing or meeting the requirements of German laws and regulations relating to milk production and distribution.

There is a short discussion of the economics of milk production and the value of sanitary methods when payment is made on the basis of quality. Various chapters are concerned with the following subjects: composition and properties of milk and their variations, the health of dairy cattle and people handling milk, the cleanliness of cows and stables, the care necessary in milking, straining, cooling, skimming, pasteurizing, distributing, etc., the chemical and bacteriological laboratory control methods and detection of adulterations and preservatives. The more common laboratory tests are described throughout the text.

The most valuable section of the book is devoted to diseases of the dairy cow. There is an especially detailed consideration of bovine tuberculosis, infectious abortion and mastitis. Various tests for their detection are outlined. Brief reference is made to foot-and-mouth disease, anthrax, symptomatic anthrax, hemorrhagic septicemia, rinderseuche, rabies, rinderpest, contagious pleuro-pneumonia, smallpox, necrobacillosis of the udder, actinomycosis, miscellaneous disorders of the reproductive organs and gastro-intestinal tract, fevers, septicemia, nephritis, tetanus, etc., from the standpoint of a safe milk supply. The author also considers the effect of drugs, poisons and unwholesome food on the milk. He also takes up the matter of man-borne diseases transmitted through milk.

The various laws covering milk production and distribution

in Germany are given and frequent reference is made to these requirements in each chapter.

The person who is especially interested in milk inspection, dairy hygiene, or public control of the milk supply will find much valuable material in this book and many suggestions as to the methods employed in Germany which may be useful in this country to insure a wholesome and safe milk supply.

H. M.

PUBLICATIONS RECEIVED

The Bionomics of *Ixodes Ricinus* L., the "Sheep Tick" of Scotland. J. MacLeod. Reprint from *Parasitol.*, xxiv (1932), 3, pp. 382-400.

A Preliminary Report on a New Antiseptic Dye, and Its Chemo-Therapeutic Uses. J. N. Frost. Reprint from *Vet. Med.*, xxvii (1932), 9, pp. 372-373.

Eradication of Pullorum Disease in Massachusetts, Twelfth Annual Report on. H. Van Roekel, K. L. Bullis, O. S. Flint and Miriam K. Clarke. (Control Series Bul. 63. Mass. Agr. Exp. Sta., Sept., 1932, pp. 80.)

The Use of Azamine in Mastitis. L. L. Parker. Reprint from *Vet. Med.*, xxvii (1932), 10, pp. 430-431.

Pregnancy Disease of Sheep. Lee M. Roderick and G. S. Harshfield. (Tech. Bul. 261. N. Dak. Agr. Exp. Sta., Oct., 1932, pp. 31. Illus.)

The Vitamin A and the Vitamin E Content of Field-Cured and Artificially Cured Alfalfa Hay. I. L. Hathaway, H. P. Davis and R. R. Graves. (Res. Bul. 62. Neb. Agr. Exp. Sta., Oct., 1932, pp. 15.)

Vacinnation of Swine Against Tuberculosis with Calmette-Guérin Culture, BCG. F. M. Hayes, C. M. Haring and J. Traum. *Hilgardia*, vii (1932), 6, pp. 235-261.

Mastitis. II. The Use of Certain Dyes in the Treatment of Mastitis. G. J. Hucker and Dorothy A. Lee. (Tech. Bul. 205. N. Y. State Agr. Exp. Sta., Nov., 1932, pp. 35.)

Horse Association of America, Report of the Thirteenth Annual Meeting of the. Chicago, Ill., Nov. 30, 1932. Wayne Dinsmore, Secretary, Union Stock Yards, Chicago, Ill., pp. 28. Illus.)

Geographical Races of Animals with Especial Reference to Reindeer. S. Hadwen. Reprint from Trans. Roy. Soc. Canada, 3rd series, xxvi, sect. v (1932), pp. 237-256. Illus.

National Research Council Organization and Members, 1932-1933. (Washington, D. C., Dec., 1932, pp. 68.)

"Pulpy Kidney" in Lambs. D. T. Oxer and H. W. Bennetts. (Pamph. 35, Coun. for Sci. & Ind. Res., Commonwealth of Australia. Melbourne, Australia, 1932, pp. 29.)

Bureau of Science, Philippine Islands, Thirtieth Annual Report of the. William H. Brown, Director. (Manila, P. I., 1932. pp. 1025-1115.)

Report of Director of Abattoir, Live Stock Markets, Veterinary Services, Ice and Cold Storage Department (City of Johannesburg, Union of S. Africa) for the period July 1, 1931, to June 30, 1932. Jas. Irvine-Smith. (Johannesburg, Union of S. Africa, 1932. pp. 26.)

Equine Osteomalacia. J. H. Kintner and R. L. Holt. Separate from *Philippine Jour. Sci.*, xlix (1932), 1. pp. 113. Illus.

STREPTOCOCCUS INFECTION IN MAN CAUSED THROUGH THE MEDIUM OF MILK FROM INFECTED UDDERS. S. V. Golledge. Vet. Rec., xii (1932), 52, pp. 1499-1501.

An outbreak of acute streptococcus disease among the personnel of a small farm is described. Four persons were affected, of whom two, the farmer and one of his cowmen, died within a few days. Hemolytic streptococci were isolated (1) from the tissues of the farmer after death, (2) from a milking-smock worn by certain of the affected persons, and (3) from the milk of two of the 38 cows comprising the herd. The outbreak is of particular interest because the streptococci from all these sources proved to be identical in their cultural and serological reactions, belonging to scarlatinal type I (F. Griffith, 1926). The very strong presumption is that the two cows were infected, through the agency of a milker, with hemolytic streptococci of human origin and that the subsequent human cases were reinfected from the milk of these two animals. The milk of the infected cows, as long as it appeared normal, was added to the mixed milk of the herd, but there was no chance of the outbreak extending because the supply was heated before distribution.

F. C. M.

THE ACTION OF QUINIDINE ON THE HEART IN THE NORMAL UNANESTHETIZED DOG. Harry Gold and Walter Modell. Jour. Phar. & Exp. Therap., xlvi (1932), 3, p. 359.

In both therapeutic and convulsive doses, quinidine does not produce slowing but acceleration of the sinus rate. Acceleration occurs in vagotomized dogs as well, especially in those cases in which the vagotomy does not result in an extremely rapid heart rate. Quinidine causes prolongation of the intraventricular conductions. This is sometimes in evidence with therapeutic doses but is most constant and pronounced after large doses. In doses up to those causing convulsions, quinidine does not produce any prolongation of A-V conductions. Frequently the P-R interval is shortened, simultaneously with the sinus acceleration.

ASCARIS LARVAE AS A CAUSE OF LIVER AND LUNG LESIONS IN SWINE. Benjamin Schwartz and Joseph E. Alicata. Jour. Parasitol., xix (1932), 1, p. 17.

Lesions observed from time to time in the liver and lungs of swine were found to be due to the presence of small pearly cysts, from 1 to 2 mm in diameter, when measured *in situ*. Each cyst contained a granular material and also showed, at times, a nematode larva in a state of evident degeneration. The larva is brittle and has a uniformly granular appearance. The lung lesions are limited to the presence of the pearly cysts, while the liver lesions are more striking and appear as a marked mottling of the surface of the organ. The mottling is due in part to an increase of interlobular tissue and in part to the presence of cysts underneath the capsule. Liver lesions, indistinguishable from those which contain discrete cysts and larvae in the cysts, are of common occurrence in swine in this country. The larvae evidently degenerate in the cysts, apparently earlier in those in the liver than in those in the lungs.

SEROLOGICAL STUDIES ON IODINATED SERA. I. Precipitins and precipitinogens. John Jacobs. Jour. Immunol., xxiii (1932), 5, p. 361.

When iodin is added to animal sera without the presence of acid or alkali, substances are formed which precipitate with antisera prepared from iodinated sera. This change takes place in the presence of aqueous solutions as dilute as 32nd normal. The specificity of substances formed in sera iodinated in neutral solutions was tested in several ways. Their specificity is similar to that of other iodinated proteins.

SEROLOGICAL STUDIES ON IODINATED SERA. II. Anaphylaxis. John Jacobs. Jour. Immunol., xxiii (1932), 5, p. 375.

About half of the guinea pigs sensitized by various methods to Lugol-guinea pig serum preparations and injected with iodinated sera exhibited a definite anaphylaxis. Seven of eight pigs sensitized to Lugol and horse serum died in acute anaphylaxis, indicating a much stronger antigenic effect when the iodin was in combination with foreign serum. Sensitizations in tuberculous guinea pigs resulted in a somewhat greater sensitivity than that produced in normal pigs. The author uses these experiments as a basis for a discussion of iodin idiosyncrasy.

AMMONIUM CHLORID DECALCIFICATION, AS MODIFIED BY CALCIUM INTAKE: THE RELATION BETWEEN GENERALIZED OSTEOPOROSIS AND OSTITIS FIBROSA. Henry L. Jaffe, Aaron Bodansky and Joseph P. Chandler. Jour. Exp. Med., lvi (1932), 6, p. 823.

In all age groups the effects of ammonium chlorid administration were found to be strikingly dependent upon the calcium intake. Dogs receiving an adequate calcium diet and ammonium chlorid showed less decalcification than those receiving a low-calcium diet, with or without ammonium chlorid. In the younger groups the added effect of ammonium chlorid to calcium-low diet brought out more striking changes than a low-calcium diet alone. When the decalcification was less severe—in the oldest dogs on the low-calcium diet with or without ammonium chlorid—generalized thinning of the bones without marrow fibrosis resulted (osteoporosis). When the decalcification was rapid and severe—in the youngest dogs on low-calcium diet, particularly with ammonium chlorid—generalized decalcification and secondary marrow fibrosis resulted (ostitis fibrosa).

THE MATERNAL TRANSMISSION OF VACCINAL IMMUNITY IN SWINE. John B. Nelson. Jour. Exp. Med., lvi (1932), 6, p. 835.

The introduction of vaccinia virus into the skin of swine calls forth a typical vesicular reaction which may be followed by a solid immunity. This acquired state of resistance was utilized in determining the route of immunity transmission from sow to young. The suckling young of immune sows, vaccinated on the seventh day or earlier, showed no reaction to the virus. Their hand-fed litter-mates, however, were susceptible and reacted with the formation of vesicles. These observations indicate to the author that the porcine placenta is largely impermeable to protective substances and establish the fact that colostrum functions as the vehicle for their transmission as it does for antibodies.

THE CELLULAR REACTIONS TO LIPOID FACTIONS FROM ACID-FAST BACILLI. Kenneth Smithburn and Florence R. Sabin. Jour. Exp. Med., lvi (1932), 6, p. 867.

A comparative study has been made of the cellular reactions induced by phosphatids from five strains of acid-fast bacilli. Each of these reactions is characterized principally by epithelioid cells and giant-cells. The phosphatids are phagocytized first by young connective tissue cells or monocytes. The lipoid is then

dispersed into fine particles, with the formation of classical epithelioid cells. A comparison has been made of the reactions induced by heat-killed and defatted tubercle bacilli with those induced by tuberculo-phosphatid. The phosphatids do not cause sensitization to tuberculin. The life cycle of the epithelioid cell has been observed in all its stages.

EFFECTS OF PANCREATIC ENZYMES ON THE TUBERCLE BACILLI. W. N. Berg. Jour. Bact., xxiv (1932), 5, p. 341.

Tubercle bacilli undergoing autolysis *in vitro* liberated soluble digestion products. Among these were acids and reducing substances. Tubercle bacilli undergoing pancreatic plus autolytic digestion *in vitro* liberated greater quantities of acids and reducing substances than by autolysis alone. The swelling of the tubercle bacilli in suspensions containing added pancreatic enzymes gave additional proof that digestion took place. Autolytic enzymes alone brought one-fourth of the weight of tubercle bacilli into solution in four days and one-third in nine days. These proportions were only slightly increased by added pancreatic enzymes.

THE USE OF BASIC SODIUM PHOSPHATE AS AN ANTIDOTE FOR HYPERCALCEMIA IN DOGS. Irvine H. Page and Jasper P. Scott. Jour. Phar. & Exp. Therap., xlvi (1932), 4, p. 431.

Basic sodium phosphate, injected intravenously into normal dogs and dogs in which the calcium has been raised by parathyroid extract, lowers the serum calcium. Though by no means ideal, this salt is a fairly effective antidote for hyperparathyroidism.

STUDIES ON THE NATURE OF THE NEGRI BODY. W. P. Covell and W. B. C. Danks. Amer. Jour. Path., viii (1932), 5, p. 557.

The cytological evidence presented, with that of other authors, together with the experimental evidence, is not compatible with the protozoan or organismal theories concerning the nature of the Negri bodies. The contention that they arise from constituents already present in the nerve cell as a result of the action of the virus is in agreement with the findings of the authors, but they consider the evidence for the participation of the mitochondra, neurofibrils and nucleolus as inconclusive. Both the Negri bodies and the smaller atypical lyssa bodies are formed

probably by alterations in the basophilic Nissl substance, the fundamental ground substance of the cell, and by addition of variable amounts of basophilic material of nuclear origin. There is no evidence that organisms on the border-line of microscopic visibility are cloaked with these cellular components in accordance with the chlamydozoal hypothesis.

TRANSFUSION EXPERIMENTS WITH THE BLOOD OF LEUKEMIC CHICKENS. F. P. Clark and J. Furth. Arch. Path., xiv (1932), 5, p. 660.

Of 15 chickens into which leukemic blood had been transfused, 9 died of leukemia from 2 to 3½ days after transfusion. The fatal leukemia in these instances was associated with multiplication of the transfused cells. Thus, when immature myeloid cells of the fowl have been stimulated by the filtrable agent of leucosis, they assume the character of tumor cells and are capable of autonomous growth. A considerable proportion of the transfused cells are rapidly removed from the circulation in all of the fowls. The spleen and the capillaries of several organs, mainly those of the liver and the lung, are active in performing this function. The bone-marrow plays little part in the removal of immature myeloid cells. In susceptible fowls the cells retained multiply in these sites; in resistant fowls they are disposed of by mononuclear phagocytes of the liver and spleen.

STUDIES ON THE REGULATION OF WATER INTAKE. I. The effect of extirpation of the salivary glands on the water intake of dogs while panting. Magnus I. Gregersen and Walter B. Cannon. Amer. Jour. Physiol., cii (1932), 2, p. 336.

The amount of water taken by dogs during 1 to 2 hours of panting is increased after extirpation of the submaxillary, sublingual and infraorbital glands and tying the parotid ducts. Therefore, under conditions which make the mouth dry, a deficient salivary flow causes thirst and increased water intake even in the absence of bodily dehydration.

STUDIES ON THE REGULATION OF WATER INTAKE. II. Conditions affecting the daily water intake of dogs as registered continuously by a potometer. Magnus I. Gregersen. Amer. Jour. Physiol., cii (1932), 2, p. 344.

An instrument (the potometer) is described whereby the

drinking of water is recorded graphically and quantitatively. Graphic records of the 24-hour intake of dogs reveal that almost all of the water is taken within 2 to 5 hours after feeding, regardless of the time food is given. Fasting usually reduces the 24-hour intake to one-fourth normal or less. If the giving of water is delayed for several hours after feeding, the 24-hour intake is ordinarily much less than when water is given *ad libitum* throughout the postprandial period. The postprandial thirst is temporary. Reasons are given for attributing it to the withdrawal of water from the body for the secretion of digestive juices.

PRENATAL INFECTION WITH THE DOG HOOKWORM, ANCYLOSTOMA CANINUM. A. O. Foster. Jour. Parasitol., xix (1932), 2, p. 112.

All the puppies of two litters born to mothers infected with hookworm larvae during pregnancy acquired prenatal infestations of the dog hookworm, *A. caninum*. Development of the larvae in the prenatally infected puppies did not take place until after birth. The fact that approximately 10 and 20 per cent of the larvae given the mothers during gestation were recovered from the puppies as mature worms was taken as indicating a widespread migration of hookworm larvae after oral infection, a phenomenon which, it is suggested, may be associated with the resistance of the host. The marked susceptibility of the puppies born to very resistant mothers was pointed out to be difficult to reconcile with a serological explanation of this type of resistance.

Iodin Production in California

A recently established chemical plant at Los Angeles, which now produces several hundred pounds of iodin a day, could be expanded so as to produce sufficient to supply the needs of the entire American market (at present 350 tons yearly). Formerly the Chilean nitrate corporation, which obtains iodin as a by-product of its fertilizer production, had a price monopoly on the product, but the California plant, extracting iodin from California oil-well brines, has broken the monopoly. The Chilean corporation some months ago cut the price from $4.00 to $3.00 a pound; more recently to the present price of $1.95 a pound. The American firm has met the price cuts and, according to report, is prepared to face further price competition.

Regular Army

Orders assigning Major Jesse D. Derrick to Fort Reno, Okla., upon completion of his tour of foreign service have been amended so as to assign him to Fort Des Moines, Iowa, for duty, instead.

Veterinary Reserve Corps

New Acceptances

		To
Hock, Leo Anthony	Capt.	193 Thurman Ave., Columbus, Ohio.
Wilcox, Arthur Adelbert	Capt.	R. D. No. 1, LaGrange, Ohio.
Fletcher, Charles Edward	2d Lt.	169 E. 33rd St., New York, N. Y.
Hernandez, Jose Constantine	2d Lt.	191 Corcuera St., Tondo, Manila, P. I.
Rust, John Howard	2d Lt.	290 Pleasant St., Concord, N. H.
Swanson, Leonard Erwin	2d Lt.	423 Federal Bldg., Salt Lake City, Utah.

Transferred from Cavalry Reserve to Veterinary Reserve

Kershaw, Cass John	2d Lt.	89 Mulberry St., Wyandotte, Mich.

A Famous Quartet

Four prominent members of the A. V. M. A., all graduates of the Ontario Veterinary College, class of 1900, are planning to celebrate the occasion of a third of a century in the veterinary profession, at Chicago during the convention in August. It is rather unusual that four members of the same class should rise to such prominence in their respective fields. The quartet consists of a practitioner, a health officer, a state veterinarian and a teacher:

J. A. Campbell, V. S., B. V. Sc., Practitioner, Toronto, Ont.

J. P. Foster, V. S., B. Sc., M. D. V., B. V. Sc., M. Sc., Department of Health, Minneapolis, Minn.

W. K. Lewis, V. S., M. D. V., State Veterinarian, Columbia, S. C.

C. D. McGilvray, V. S., M. D. V., D. V. Sc., Principal of the Ontario Veterinary College, Guelph, Ont.

TWELFTH INTERNATIONAL VETERINARY CONGRESS

What It Is and What It Means

The veterinary profession of the United States was placed on trial in 1930, when its invitation was accepted by the International Veterinary Congress to meet in this country in 1934. This will be the first time the United States has been accorded this honor. The veterinary profession of our country is held in high esteem by the members of the profession abroad and much is expected of us. The success of this international event will be measured largely by the degree of preparation, which should become intensive at once, particularly with regard to providing the necessary funds to carry on the Congress in a manner befitting the veterinary profession of this country. It is important that our national organization, the several regional, 47 state and 100 or more local organizations contribute their part to the success of the undertaking by coöperating with the officials of the International Congress in every way possible. In order that you may have more definite information concerning this Congress, some of the most frequently asked questions will be answered as follows:

1. What is the International Veterinary Congress?

An association of veterinarians which includes in its membership the leading veterinarians of all countries.

2. What is the aim of the International Veterinary Congress?

To provide an interchange of information with reference to the latest knowledge and achievements in veterinary science. With this end in view, the most important scientific subjects relating to veterinary medicine and surgery are discussed by outstanding authorities of the countries represented at the Congress. Such meetings result in establishing contacts and friendships between the members of the profession in various parts of the world, which are mutually helpful in the development of our profession.

3. How is the membership of the Congress divided?

The membership consists of (a) Honorary Members, (b) Ordinary Members, and (c) Extraordinary Members.

Honorary members are those on whom the Congress has conferred honorary membership in recognition of their scientific work or of their services to the profession and science.

Ordinary members are delegates of foreign governments, delegates of veterinary and other colleges, delegates of veterinary societies, delegates of agricultural corporations, delegates of authorities, state and municipal administrations and veterinarians, and other representatives of medical science or practice admitted by the Organizing Committee.

Extraordinary members are veterinary students and other persons considered eligible by the national committees of the various countries.

4. How large a membership has the International Veterinary Congress?

The membership in 1930 consisted of approximately 1,500 ordinary members, and 59 extraordinary members. The number of honorary members is necessarily limited.

5. What are the dues and financial administration?

The revenues of the Congress consist of subscriptions from members and voluntary contributions from authorities, societies and private persons. These funds must be solicited in advance of the Congress.

6. What are the officials and committees of the Congress?

A president, three vice presidents, a general secretary, a treasurer and the required number of under-secretaries. The committees: Committee on Honor; Permanent Committee of the International Veterinary Congress; Organizing Committee; Finance and General Purpose Committee; Program Committee; Entertainment Committee. The various countries organize national committees for each Congress. At the final meeting of the Congress, the date and place of the succeeding Congress is determined, with the previous approval of the Permanent Committee.

7. What is the Permanent Committee?

The Permanent Committee corresponds to a board of directors of a bank. It formulates the policy of International Congresses, passes upon the subjects to be placed on the program for the next Congress, considers all resolutions before final action by the Congress, protects the common interest, and serves as a connecting link between successive Congresses.

8. What is the Organizing Committee?

An Organizing Committee is appointed, in the country where the Congress is to be held, for the purpose of making preparations for the Congress. It is authorized to appoint special committees to carry on the preliminary work, to organize the sections, to take charge of the financial administration, to arrange receptions, excursions, etc. Subjects to appear on the program are selected by the Permanent Committee in concert with the Organizing Committee. National committees are appointed in other countries on the initiative of the Organizing Committee.

9. How is the program prepared?

The procedure in preparing a program for an International Veterinary Congress is as follows: The Organizing Committee selects subjects and reporters, and submits the tentative program to the Permanent Committee for approval. The Permanent Committee considers the tentative program in connection with the subjects and reports recommended by the national committee of various countries and confers with the Organizing Committee in modifying the tentative program to make it as comprehensive, constructive and interesting as possible. A sufficient amount of material is now in the hands of the Permanent Committee for an attractive program, and will be published shortly.

In summing up, it may be stated that an International Congress bears the same relation to the A. V. M. A. as the latter does to a state veterinary association, or as a state association bears to a county or local association. The general aims and ideals of all these organizations are the same, but the purpose and results become more comprehensive as the scope of the various activities is broadened. There is therefore nothing magical about such Congresses.

The first International Veterinary Congress was held at Hamburg, Germany, in 1863. It was called by Professor Gamgee, of Scotland, to discuss the geographical distribution of communicable diseases of animals and the means of controlling such diseases. Subsequent Congresses have been held as follows:

1865	Second Congress	Vienna, Austria
1867	Third Congress	Zurich, Switzerland
1883	Fourth Congress	Brussels, Belgium
1889	Fifth Congress	Paris, France
1895	Sixth Congress	Bern, Switzerland
1899	Seventh Congress	Baden-Baden, Germany
1905	Eighth Congress	Budapest, Hungary
1909	Ninth Congress	The Hague, Holland

1914	Tenth Congress*	London, England
1930	Eleventh Congress	London, England

We should all be looking forward eagerly to meeting and honoring some of these men who have contributed so generously to the advancement of veterinary science. And it is our earnest desire that the 1934 convention be outstanding in extending the outposts of knowledge on all lines of veterinary science, especially in its application to the public welfare throughout the world.

Doctor Barnes Honored

The medal and certificate of merit offered by the Philadelphia Society for Promoting Agriculture for distinguished service of a lasting character to agriculture was awarded to Dr. Miller F. Barnes (U. P. '11), Director of Laboratories, Pennsylvania Bureau of Animal Industry, at the winter meeting and dinner of the Society on January 26, 1933. The honor was conferred on Dr. Barnes in recognition of his work in developing and promoting a successful plan for the elimination of Bang's disease. The award was unusual in that this is only the second time it has been made in recent years. Dr. Barnes was also elected an honorary member of the Society, of which there are only six others.

The Society is the oldest and most distinguished of its kind in the country. It was chartered in 1785 and is now 148 years old. George Washington and other prominent men of his day were among its early members. Its membership is limited to 100 and includes men prominent in all walks of life who have a common interest in agriculture. The dinner was largely attended by the members, and the guests included many veterinarians and dairymen. Dr. C. J. Marshall, of the veterinary faculty of the University of Pennsylvania, officiated in the rôle of toastmaster.

Foot-and-Mouth Disease in Europe

Outbreaks of foot-and-mouth disease in Great Britain during 1932 totaled 24. This compares with 8,327 in France; 18,614 in Germany; 10,586 in Holland, and 2,994 in Belgium. Figures for December, 1932, were available only in the case of Great Britain, the other totals being for the January-November period, according to the *Veterinary Journal* (London).

*Not completed because of the outbreak of the World War.

COMMUNICATION

SANTA FE TO THE FRONT

TO THE EDITOR:

In the March JOURNAL just received I note in the article by C. A. Cary, (Report on Meat and Milk Inspection) under New Mexico, that Albuquerque is the only city in the State where a veterinarian is the milk inspector.

I wish to correct that statement because Dr. H. C. Schipman was at one time inspector at Las Cruces and as far as I know still is. As for Santa Fe, I not only have been inspecting milk but have the sanitation of the entire city, as you will note by the above letterhead. I have held this position for the past year, during which time the Standard Ordinance has been adopted and put into effect, restaurants have been inspected and scored monthly, markets are inspected regularly and the city in general cleaned up. I have a compulsory meat inspection ordinance before the council, which will more than likely be put into effect soon. I not only inspect the dairies but also make the laboratory bacteriological examination of the milk.

So don't forget to let the profession know that Santa Fe, N. M., is pushing ahead and will in the near future lead all the cities in New Mexico as to meat and milk inspection.

One suggestion for the Association is that it get the U. S. Public Health Service to insert a clause, in the Standard Ordinance, setting forth the qualifications of the inspectors.

T. I. MEANS, *Health Inspector.*

Santa Fe, N. M., March 11, 1933.

Meat Inspection and County Agents

Total appropriations of the United States Department of Agriculture for the fiscal year 1932 were $313,543,328. A chart prepared by the Statistical Bureau of the *Chicago Daily Tribune* shows how the money was divided among the various bureaus and services of the department, and some comments are made on the work of these bureaus and services. A total of $5,650,503 was expended for meat inspection. Comment: "One of the highly essential services of the department." A total of $10,402,320 (nearly twice as much) was the cost of extension service. Comment: "Educating the farmer in farming, and his wife in fancy work."

AMERICAN VETERINARY MEDICAL ASSOCIATION

Financial Report—Dr. M. Jacob, Treasurer

For year ended December 31, 1932

Cash balances December 31, 1931 (banks).....		$ 3,112.30
Receipts, January 1, 1932, to December 31, 1932:		
Received from the Secretary.....	$30,274.83	
Interest on time deposits and bonds.....	2,067.95	
Refund premium on depository bond.....	175.00	
Salmon Memorial Fund (loan repaid).....	250.00	
Women's Auxiliary (loan repaid).....	500.00	
Total receipts		33,267.78
		$36,380.08
Time deposits placed in checking accounts.....		33,907.90
Revolving fund in hands of Dr. Hoskins.....		500.00
		$70,787.98
Disbursements, January 1, 1932, to December 31, 1932:		
Expenses (A. V. M. A. and JOURNAL).....	$34,699.70	
Loan—Salmon Memorial Fund.....	250.00	
Loan—Women's Auxiliary	500.00	
Bonds purchased (par $32,000).....	$32,584.38	
Interest accrued at time of purchase.	365.96	
	32,950.34	
Total disbursements		68,400.04
Total cash resources.....		$ 2,387.94
Bonds (par $41,000).....		41,259.02
Total assets, December 31, 1932.....		$43,646.96
Total assets, December 31, 1931.....		46,194.84
Decrease for period.....		$ 2,547.88

DISTRIBUTION OF ASSETS

FUND	CASH	BONDS (COST)	TOTALS
A. V. M. A.....	$1,142.28	$ 5,821.94	$ 6,964.22
JOURNAL	1.245.66	35,437.08	36,682.74
Totals	$2,387.94	$41,259.02	$43,646.96

ORGANIZATION OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, 1932-1933

(Concluded from page 130, January issue)

RESIDENT STATE SECRETARIES

Alabama ..... D. J. Meador, c/o L. & N. R. R., Montgomery.
Arizona ..... J. C. McGrath, 1115 E. Van Buren St., Phoenix.
Arkansas ..... J. H. Bux, 401 N. Elm St., Little Rock.
California ..... Earl M. Keef, Apt. 2, 676 Alma Ave., Oakland.
Colorado ..... J. G. Berthelson, Alamosa.
Connecticut ..... Edwin Laitinen, 993 N. Main St., West Hartford.
Delaware ..... C. C. Palmer, University of Delaware, Newark.
Dist. of Columbia .... H. E. Moskey, Food & Drug Administration, Dept. of Agr., Washington.
Florida ..... J. V. Knapp, The Capitol, Tallahassee.
Georgia ..... L. J. Kepp. 420 Edgewood Ave. N. E., Atlanta.
Idaho ..... J. E. Ellis, 404 Thatcher St., Boise.
Illinois ..... A. E. Dickerson, 225 E. Washington St., Springfield.
Indiana ..... John F. Bullard, Purdue University, Lafayette.
Iowa ..... A. H. Quin, Jr., 313 49th St., Des Moines.
Kansas ..... E. F. Kubin, McPherson.
Kentucky ..... T. P. Polk, 410 Rose St., Lexington.
Louisiana ..... J. A. Goodwin. Box 584, New Iberia.
Maine ..... M. E. Maddocks, 7 School St., Augusta.
Maryland ..... E. M. Pickens, College Park.
Massachusetts ..... H. W. Jakeman, 44 Bromfield St., Boston.
Michigan ..... B. J. Killham, Michigan State College, East Lansing.
Minnesota ..... D. B. Palmer, Wayzata.
Mississippi ..... Robt. H. Stewart, Hinds County Health Dept., Jackson.
Missouri ..... H. A. Wilson, Box 638, Jefferson City.
Montana ..... E. A. Tunnicliff, Montana Agr. Exp. Station, Bozeman.
Nebraska ..... P. L. Cady, Arlington.
Nevada ..... Edwards Records, University of Nevada, Reno.
New Hampshire ..... R. W. Smith, 161 Court St., Laconia.
New Jersey ..... J. G. Hardenbergh, Walker-Gordon Lab. Co., Plainsboro.
New Mexico ..... H. C. Schipman, Las Cruces.
New York ..... C. E. Hayden, New York State Veterinary College, Ithaca.
North Carolina ..... William Moore, N. C. Dept. of Agr., Raleigh.
North Dakota ..... T. O. Brandenburg. Box 532, Bismarck.
Ohio ..... H. A. Hoopes, La Rue.
Oklahoma ..... C. C. Hisel, 209 W. 20th St., Oklahoma City.
Oregon ..... W. H. Lytle, State Office Bldg., Salem.
Pennsylvania ..... B. Scott Fritz, Strasburg.
Rhode Island ..... T. E. Robinson, 92 High St., Westerly.
South Carolina ..... Frank E. Kitchen, Greenville.
South Dakota ..... G. P. McCue, 114 Fourth Ave. S. W., Aberdeen.
Tennessee ..... J. H. Gillmann, Box 2321, DeSoto Station, Memphis.
Texas ..... Frank D. Porter, 1121 S. Henderson St., Fort Worth.
Utah ..... Walstein H. Hendricks, 648 Lake St., Salt Lake City.

Vermont .....G. N. Welch, 43 Union St., Northfield.
Virginia .....I. D. Wilson, Virginia Polytechnic Inst., Blacksburg.
Washington .....John R. Fuller, 14 S. 4th St., Walla Walla.
West Virginia.....S. E. Hershey, Box 283, Charleston.
Wisconsin .....Walter Wisnicky, Dept. of Agriculture and Markets, Madison.
Wyoming .....Clement E. Wilmot, 310 State House, Cheyenne.

RESIDENT TERRITORIAL SECRETARIES

Alaska .....Jule B. Loftus, Juneau.
Canal Zone.....Lt. Col. A. L. Mason, Corozal.
Hawaii .....L. E. Case, Box 296, Honolulu.
Porto Rico.....H. L. Van Volkenberg, Agr. Exp. Sta., Mayaguez.
Virgin Islands.....G. A. Roberts, Christiansted, Saint Croix.

RESIDENT PROVINCIAL SECRETARIES

Alberta .....J. C. Hargrave, Box 673, Medicine Hat.
British Columbia.....J. G. Jervis, Milner.
Manitoba .....Alfred Savage, Manitoba Agr. College, Winnipeg.
New Brunswick.....David J. McLellan, Swift Canadian Co., Ltd., Moncton.
Nova Scotia.....William W. Jakeman, 3 Doyle St., Halifax.
Ontario .....R. A. McIntosh, Ont. Vet. College, Guelph.
Prince Edw. Island..W. H. Pethick, Charlottetown.
Quebec .....A. A. Etienne, 1225 Drummond St., Montreal.
Saskatchewan .....Mark Barker, Post Office Bldg., Regina.

FOREIGN CORRESPONDING SECRETARIES

Bermuda .....C. J. Cooper, "Kelton," Pembroke.
China .....H. C. Evangelista, Box 1170, Shanghai.
Colombia .....Roberto P. Guerrero, Apartado 149, Bogota.
Cuba .....L. A. Beltran, Box 883, Havana.
England .....R. W. Tuck, c/o American Consulate, 18 Cavendish Sq., London, W. 1.
Hungary .....A. Kotlan, Royal Hungarian Vet. College, Budapest, VII.
Jamaica .....Stephen Lockett, Dept. of Agr., Hope, Kingston.
Mexico .....L. Santa Maria, Apartado Postal 2067, Mexico, D. F.
New Zealand.....W. C. Ring, 62 Albert St., Auckland.
Peru .....J. F. Mitchell, c/o Cerro de Pasco Copper Corp., Oroya.
St. Kitts.....E. F. Jardine, Box 18, Basseterre.
Scotland .....A. W. Whitehouse, Glasgow Veterinary College, 83 Buccleuch St., Glasgow.

More Swine in England and Wales

An increase of over 400,000 in the total hog population of England and Wales is reported for the year 1932 over 1931. The 1932 total was 3,184,530; the 1931 total, 2,783,000. The total for all of the British Isles in 1932 is given as 4,796,625. These figures compare with 5,000,000 in Denmark; 20,000,000 in Germany; 55,000,000 in the United States.

STATE VETERINARY MEDICAL ASSOCIATION OF TEXAS

Addresses on technical subjects marked the first session of the twenty-third annual convention of the State Veterinary Medical Association of Texas, which opened in the Plaza Hotel, San Antonio, January 5, 1933, with more than 100 veterinarians from all over Texas in attendance.

The meeting was called to order by Dr. W. F. Hayes, of Farmersville, president; Rev. P. B. Hill pronounced the invocation; Dick O. Terrell welcomed the vistors, and Dr. I. B. Boughton responded.

Contributors to the program on the first day were: Drs. T. O. Booth, Temple; J. S. Watson, Mexia; T. O. Scott, Waco; A. A. Lenert and P. W. Burns, College Station; Frank P. Mathews, Alpine; W. R. Sanderson, Brownwood; D. H. Bennett, San Angelo; M. A. Peck, Fort Worth; M. S. Starnes, Dallas.

One special feature that proved interesting and of much value to the small-animal men was the round-table discussion conducted by Dr. U. E. Marney, of San Antonio. The consensus of opinion of the members present was that Dr. T. O. Booth presented the best one-man program ever heard. His subject, "Old and New Preparations in Practice," covered the newer calcium preparations, nembutal and azamine. Dr. Booth also mentioned some of the practical points in connection with the scientific use of drugs and equipment, so that clients will realize that veterinary medicine is a profession and not a job for anybody and everybody to undertake.

Delegates were guests of the Gebhardt Chili Company at a luncheon at noon, as were delegates to the Ladies' Auxiliary of the organization, meeting here concurrently with the veterinarians.

The annual dinner was held at the Plaza Hotel and was attended by delegates to the auxiliary, many of the members and their wives, and a number of visitors. The speaker of the evening was Dr. N. F. Williams, State Veterinarian and President

of the A. V. M. A. He spoke at length, with his usual brilliance and clarity, on the aims and problems of the A. V. M. A.

A business session was held after the dinner, and the following officers were elected: President, Dr. T. O. Scott, Waco; first vice-president, Dr. R. L. Rhea, San Antonio; second vice-president, Dr. S. S. Severn, Seguin; secretary-treasurer, Dr. D. Pearce, Leonard (reëlected).

On Friday, the second day of the meeting, the veterinarians were guests at an animal clinic at the Army Post at Fort Sam Houston. Maj. W. H. Houston, of the Veterinary Corps, and his assistants gave valuable information on the use of x-ray in the treatment of animal ailments and in handling of rabies.

One of the most enjoyable of the entertainment features was the lunch served the veterinarians in the mess at Fort Sam Houston. It was an occasion for reminiscences by some of the guests.

D. PEARCE, *Secretary.*

WESTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

Old Man Depression and hard times were pushed into the background, at least for the time being, as the meeting of the Western Michigan Veterinary Medical Association got under way in the small-animal hospital of Dr. J. Y. Veenstra, of Grand Rapids, January 5, 1933.

Dr. L. L. Miller, of Caledonia, president of the Association, fired point-blank at the idea that the average veterinary meeting does not have enough clinical material, as found in the field by the average practitioner. His suggestion was that, instead of sending away for someone to perform an operation, the active members do it themselves, and do it under field conditions. He pointed out that it is no hard matter for an operator to perform an operation under perfect conditions, but for a practitioner to do the same thing under field conditions is something else.

A very fine talk was given by Dr. W. C. Beets, a physician of Grand Rapids, on "Undulant Fever from the Physician's Standpoint." Dr. Beets pointed out that the disease is not a new one. We had it during the early Bible days. Jacob knew something about abortion that he failed to hand down. His stock carried full time, while the stock of his father-in-law aborted. Perhaps it was not all in the peeled willow branches. Dr. Beets stated as an historical fact that women in the Middle Ages contracted the disease from animals.

Dr. Burton A. Perry, of Hastings, spoke on "Veterinary Practice Problems." Among other things mentioned were these: Take inventory of yourself if you would be a real veterinarian. Know where you stand financially. Consider your cash client. Give him the benefit of a discount, but book the other fellow for every dime of credit he asks for. Ethics—certainly—but one must be ethical if he expects the other fellow to be the same. Keep your fellow practitioner in mind.

Dr. J. W. G. Hansen, of Greenville, brought with him a small museum of specimens on "Displacement of the Intestine of the Horse." His paper was so interesting that the shades of night were falling before the discussion ended. After giving the important clinical differences between so-called colic and displacement, Dr. Hansen clinched his talk with the statement that he could diagnose displacement with a trocar, and prove it upon postmortem.

Dr. H. Dykema, of Muskegon, asked to be excused from his talk on "Skin Diseases of Small Animals," as it was getting late. However, he did mention that, from observation and study, he had found most of the skin diseases in small ainmals to be due to intestinal parasites. Especially is this true of tapeworm infestation. A few prescriptions were given, after which the question-box was brought forth. Dr. Herbert Elzinga, of Marne, handled this part of the program very much to the satisfaction of all present.

Those who served as officers of the Association during 1932 were reëlected for 1933. They are: President, Dr. L. L. Miller, Caledonia; vice-president, Dr. H. Dykema, Muskegon; secretary-treasurer, Dr. Chas. H. Haasjes, Shelby.

CHAS. H. HAASJES, *Secretary.*

WEST CENTRAL OHIO VETERINARY MEDICAL ASSOCIATION

Veterinarians of five Ohio counties met on January 6, 1933, at Lima, and formed the West Central Ohio Veterinary Medical Association. The new association has 32 members, drawn from Allen, Auglaize, Van Wert, Putnam and Hardin counties. The first meeting was scheduled for February 10 at Lima, with subsequent meetings on the second Friday of each month. Officers for the ensuing year are: President, Dr. J. E. Morris, Lima; secretary-treasurer, Dr. A. E. Stettler, Columbus Grove. The

office of vice-president will have a different incumbent each month, the members serving in alphabetical order. Vice-president for the first month was Dr. H. F. Failor, of Spencerville.

OKLAHOMA VETERINARY MEDICAL ASSOCIATION

The eighteenth annual meeting of the Oklahoma Veterinary Medical Association, which was held in the Skirvin Hotel, Oklahoma City, January 9-10, easily ranks among the most successful conferences of this organization. Subtropical weather, smiling skies, a keen interest in several important legislative matters pending in behalf of the veterinary profession, together with a good program, proved to be a temptation which our members were unable to resist. They came from all parts of the State to the number of 71. Visitors from outside of the State swelled the total attendance to more than 80, which is almost a record for Oklahoma.

The meeting was opened by Dr. W. C. McConnell, Vice-President, acting in the absence of Dr. C. C. Nickel, President, who was unable to be present, owing to illness in his family. Following the regular order of business, during which reports of officers and committees were read, election of officers and other association business transacted, Dr. N. F. Williams, President of the A. V. M. A., addressed the meeting. His subject was well chosen and delivered in masterful style. Reviewing the history of the veterinary profession, he pointed to the many significant achievements to its credit, emphasizing the fact that it had earned for itself the right to rank among the strictly scientific professions and an important place in the social and economic world.

Dr. E. R. Frank, of Kansas State College, presented the subject of "Sterility in Cattle" in two sections; the first one covering "Anatomy and Physiology of the Genital Tract and Diagnosis of Pregnancy," the second, "Causes, Diagnosis and Treatment of Sterility."

Dr. S. J. Schilling, of Kansas City, Mo., also contributed two subjects to the program: "Equine Infectious Anemia" and "Postmortem Diagnosis," both excellent papers of a highly technical nature which aroused an unusual amount of interest and discussion.

Under the title "Obstetrics in the Large Animals," Dr. E. V. Robnett, of Oklahoma City, gave a very enlightening talk on the practical methods of procedure in various forms of dystocia. With the aid of almost life-size charts showing a number of ab-

normal presentations, he demonstrated the technic of epidural anesthesia and the use of various kinds of obstetrical instruments. Epidural anesthesia was especially stressed as the most important and humane aid to the obstetrician.

Dr. H. W. Orr, of the Oklahoma A. & M. College, gave an excellent illustrated talk on "Physiology of Milk Secretion and the Common Disturbances of the Udder." His remarks were followed with interest and brought about a lengthy discussion.

Dr. H. D. Smiley, of Waynoka, gave a very instructive and entertaining account of his experiences and observations of the veterinary situation in Europe on his recent visit to these countries. He took one year of advanced work in Vienna and visited many countries and important cities while there.

Dr. W. C. McConnell, of Holdenville, read a paper entitled "Gleanings from the Practitioner's Scrapbook," compiled from a real scrapbook which he has maintained for many years. It proved to be a veritable mine of information on all sorts of useful subjects. The scrapbook idea has become a hobby with Dr. McConnell and he strongly recommends it to others.

Striving to improve the existing relations between veterinarians and agricultural extension workers, Mr. D. P. Trent, Director of Extension for Oklahoma, was invited to appear on the program. His remarks on "Coöperation in Rendering Service to Farmers and Live Stock Disease Control" were well received. They should mark the beginning of a better understanding between the county agent and the veterinarians of this State.

A splendid banquet, enlivened by orchestral and vocal numbers and other forms of entertainment, was held Monday evening, January 9, with Dr. O. E. Robinson, of Bixby, acting in the capacity of master of ceremonies. The numerous prominent guests of the Association included a goodly number of members of the State Legislature, which was then in session.

Following the very popular practice of former years, the Association entertained the ladies throughout the meeting. A delightful luncheon at the Y. W. C. A. and a theater party were the main features of the entertainment.

The following were elected officers of the Association for the ensuing year: President, Dr. W. C. McConnell, Holdenville; vice-president, Dr. J. T. Wilson, Pawnee; treasurer, Dr. F. Y. S. Moore, McAlester (reëlected); secretary, Dr. C. H. Fauks, Oklahoma City (reëlected).

C. H. FAUKS, *Secretary.*

OHIO STATE VETERINARY MEDICAL ASSOCIATION

The Ohio State Veterinary Medical Association held its fiftieth annual meeting at the Neil House, Columbus, January 11-12, 1933. The attendance was very good, considering the conditions that exist today. Two hundred veterinarians and ladies attended the dinner session on January 11. Dr. Glenn Adams, Cincinnati, of radio fame, gave a very interesting illustrated lecture on types and breeds of dogs. Dr. N. F. Williams, president of the American Veterinary Medical Association, was present at the dinner and gave a brief but very interesting talk.

The first day of the meeting was devoted to business and reports of the various committees. These reports were of more importance than usual, and the report of the Special Committee on Swine Vaccination, presented by Dr. J. W. Jackman, of Columbus, was especially interesting and valuable.

The program on January 12 was presented by Ohio men, with the exception of a very interesting address by Dr. N. F. Williams. The following program was presented:

"Practical Anesthesia in Small Animals," by Dr. C. D. Barrett, Akron.

"The Brown Dog Tick and Its Control," by Dr. A. R. Theobald, Cincinnati.

"Credits and Collections," by Dr. E. A. Downs, Mount Sterling.

"Intestinal Parasites of the Horse and Their Control," by Dr. W. R. Krill, Ohio State University, Columbus.

"The Use of Calcium Salts in the Treatment of Milk Fever," by Dr. R. R. Laughlin, South Euclid.

"Shipping Fever in Cattle," by Dr. W. A. Axby, Harrison. (Read by Dr. C. C. Watts, Circleville.)

"Undulant Fever," by Mr. Leo F. Ey, Laboratories Division, Ohio Department of Health, Columbus.

Officers elected to serve during 1933 are: President, Dr. O. C. Alspach, Marion; vice-president, Dr. E. V. Hover, Lima; treasurer, Dr. D. C. Hyde, Columbus (reëlected); secretary, Dr. R. E. Rebrassier, Columbus (reëlected). The Executive Committee members for the term are: Dr. W. F. Guard, Columbus; Dr. H. A. Salt, New Philadelphia, and Dr. E. J. Starbuck, Port Williams.

R. E. REBRASSIER, *Secretary.*

MINNESOTA STATE VETERINARY MEDICAL ASSOCIATION

The thirty-sixth annual meeting of the Minnesota State Veterinary Medical Society was held at the West Hotel, Minneapolis, January 12-13, 1933. The attendance was larger than expected;

nearly 200 veterinarians were registered. Dr. D. B. Palmer, of Wayzata, president, presided over each of the sessions. The first session was taken up with reports of committees and officers. The Secretary-Treasurer stated that there were 243 active members at the present time, which was one more than for 1931-1932. There was also a satisfactory balance in the treasury.

Under new business, a proposed lien law was discussed. A vote was taken and it showed a very large majority in favor of such a law. It was voted to request the President to appoint a special committee to work for the passage of a lien law by the present legislature.

Dr. James Farquharson, of the Colorado Agricultural College, presented a discussion on "Some Phases of Equine Practice." He gave some very interesting suggestions in regard to the treatment of a number of conditions affecting horses.

Drs. C. F. Schlotthauer, H. E. Essex and F. C. Mann, of the Mayo Clinic, Rochester, presented an illustrated paper showing the details of the operation of cecal occlusion in the prevention of blackhead in turkeys. Dr. Schlotthauer presented the discussion. The results these workers have had in the prevention of blackhead, by this operation, are indicative of its worth. (This paper will be published in the JOURNAL.)

In the evening, entertainment was provided during the banquet. Dr. C. E. Cotton, of Minneapolis, presided as toastmaster and introduced the speaker, Dr. K. F. Meyer, of the University of California, who gave a very interesting discussion on "Encephalomyelitis in Horses, Psittacosis, and Other Animal-borne Infections." His remarks were profusely illustrated with slides and moving pictures. Dr. Meyer spoke for four hours. During this time he received the close attention of his hearers. He brought much new information, not only in regard to the etiology of these diseases, but also in respect to their prevention and control.

On Friday, Dr. E. C. McCulloch, of the University of Wisconsin, presented a discussion on "Problems in Relation to Disinfection." He brought out many practical points which could be adopted by the practitioner in his daily work.

Dr. Robert Graham, of the University of Illinois, discussed "Poultry Diseases and Some of the Problems of Horse Parasite Control in Illinois." This was illustrated. Dr. Graham discussed the work carried on in Illinois in the treatment of parasites in horses and the testing for bacillary white diarrhea.

In the afternoon, Dr. C. N. McBryde, of the United States

Department of Agriculture, Ames, Iowa, spoke on "The Modes of Transmission and Sources of Infection in Hog Cholera." Among other things, Dr. McBryde pointed out that the human factor in the transmission of hog cholera is not so great as it was at one time suspected to be.

Dr. F. F. Parker, of Des Moines, Iowa, presented a discussion on "The Handling of a Small-Animal Practice," in which he brought out many practical points which were actively discussed by the members.

The following were elected as officers for the ensuing year: President, Dr. A. C. Spannaus, Waconia; 1st vice-president, Dr. P. H. Radford, Slayton; 2nd vice-president, Dr. P. H. Riede, Mabel; secretary-treasurer, Dr. C. P. Fitch, Saint Paul (reëlected). Dr. C. L. Tompkins was elected member of the Board of Trustees for a three-year term.

C. P. FITCH, *Secretary.*

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY

The forty-ninth annual meeting of the Veterinary Medical Association of New Jersey was held at the Hotel Hildebrecht, Trenton, January 16-17, 1933, with 125 persons in attendance, including members and visitors from the metropolitan areas of Philadelphia and New York.

The afternoon of the first day was devoted to the following program: Dr. N. J. Pyle, of Pearl River, N. Y., spoke on the various factors involved in "Canine Distemper—New Developments in Prophylaxis and Treatment." Dr. Pyle explained methods that have given best results and emphasized that dogs should not be in the incubative stage of distemper nor infested with intestinal parasites at the time immunization is carried on.

"Recent Milk Legislation in New Jersey" was discussed by Dr. James E. Russell, of Lawrenceville, a member of the New Jersey State Board of Health and former Dean of Teachers' College at Columbia University. After explaining the purposes and provisions of the new state milk law, Dr. Russell asked for the help of veterinarians in carrying on the work and suggested that the Association consider the advisability of appointing a special committee to discuss with the State Board of Health problems of common interest in order to work out practical, professional and efficient coöperation. Later in the meeting, this suggestion was acted upon and a special committee appointed.

"The Status of the Veterinarian in Milk Hygiene," by Dr. L. A. Klein, University of Pennsylvania, served as an excellent supplement to Dr. Russell's remarks. Dr. Klein called attention to some of the inconsistencies of present-day dairy farm inspection methods, suggested that qualified veterinarians should make not only physical examinations of dairy cattle but also the sanitary inspections of dairy farms, and made a plea for uniform methods of dairy farm inspection. As noted by Dr. Klein, there are standards for butter-fat and bacterial analyses but no standard for physical examinations and dairy inspections. As a working basis, he suggested that the Report of the Special Committee on Dairy Farm Inspection of the American Veterinary Medical Association* be used as much as possible.

Dr. R. B. Little, of the Rockefeller Institute, Princeton, presented a paper prepared jointly with Dr. F. S. Jones on "The Effect of Udder Infection on Milk in Acute Mastitis." Correlations of whey protein content with pH determinations, leucocyte counts and other special tests of milk samples from mastitis were given. The results offer a refinement in technic which undoubtedly will have valuable application.

In the evening, the annual dinner was held, at which a notable array of speakers was presented by the toastmaster, Dr. T. E. Smith, of Jersey City. Dr. N. F. Williams, of Fort Worth, Tex., president of the American Veterinary Medical Association, gave a comprehensive and inspiring address on the attainments and responsibilities of the veterinary profession. Dr. John R. Mohler, Chief, U. S. Bureau of Animal Industry, presented a new and extremely valuable concept of promoting and correlating veterinary activities in his paper on "The Effectiveness of Veterinary Organization." As a final treat, Dr. C. J. McAnulty, of Atlantic City, gave his illustrated lecture on "The Breeds of Dogs and Dog Shows." Dr. McAnulty's recognized ability not only in treating but also in judging dogs, and his wide experience in both fields make his presentations most interesting.

On the morning of the second day the Association heard two splendid talks, the first by Dr. W. A. Hagan, Dean of the New York State Veterinary College, on "Studies on the Control of Johne's Disease." Dr. Hagan's studies in this field and his thorough knowledge of the subject enable him to treat it most capably. Those who were privileged to hear the lecture are

*Jour. A. V. M. A., lxxiii (1928), n. s. 26 (6), pp. 770-776.

indebted to Dr. Hagan for the opportunity to obtain a clear understanding of the existing knowledge of Johne's Disease.

Dr. H. F. Dailey, Chief Veterinarian, Angell Memorial Hospital, Boston, Mass., aroused keen interest in his talk on "Parathyroid Therapy in Small Animals." Dr. Bailey emphasized that excellent results are obtainable by oral administration of fresh desiccated parathyroid gland tablets, particularly in rickets, osteomalacia, chronic discharging sinuses and other diseases in which there is evidence of impaired nutrition and certain toxic manifestations. He stressed the importance of the parathyroid gland in maintaining acid-base equilibrium and the necessity for giving plenty of calcium and phosphorus, preferably in the form of milk, along with parathyroid therapy.

In the afternoon, a small-animal clinic was held and a number of operations and demonstrations given. These included cecectomy, chronic dislocation of the hip, cesarean section, and removal of mammary tumors. The Local Committee, of which Dr. J. H. McNeil was chairman, provided splendid facilities for the meeting and clinic and their efforts accounted for the excellent attendance.

At the annual business session the following officers were elected for 1933: President, Dr. W. B. Maxson, Flemington; 1st vice-president, Dr. E. R. Cushing, Plainfield; 2nd vice-president, Dr. C. J. McAnulty, Atlantic City; treasurer, Dr. Harry Ticehurst, Shrewsbury; secretary, Dr. J. G. Hardenbergh, Plainsboro.

The Fiftieth Anniversary Meeting will be held in 1934 and special plans will be made for that occasion.

J. G. HARDENBERGH, *Secretary.*

ARKANSAS VETERINARY MEDICAL ASSOCIATION

The Arkansas Veterinary Medical Association held its annual meeting at the Marion Hotel, Little Rock, January 16-17, 1933. After an address by President R. W. Williams, of El Dorado, who called the meeting to order, the following program was given:

"Meat and Milk Inspection," by Dr. E. D. Wineland, Booneville.

"General Case Reports on Equine Practice," by Dr. Walter Martin, Jonesboro.

"The Comparative Results of Anthrax Vaccine in Field Use," by Dr. C. D. Stubbs, Little Rock.

"Running Fits or Fright Disease," by Dr. N. J. Pearce, Fort Smith.

"Indigestion in Dairy Cows," by Dr. W. S. Rader, Camden.

"Canine Distemper," by Dr. J. B. Kingery, Hot Springs.

"Malignant Jaundice," by Dr. John H. Gillmann, Memphis, Tenn.

The second day was given over to a clinic, at which a number of interesting cases were presented.

At the business session, the following were elected as officers for the coming year: President, Dr. Rease Mitcham, Little Rock; vice-president, Dr. Walter Martin, Jonesboro; secretary-treasurer, Dr. C. H. Larson, Clarksville.

C. H. LARSON, *Secretary.*

KANSAS VETERINARY MEDICAL ASSOCIATION

The twenty-ninth annual convention of the Kansas Veterinary Medical Association was held in Wichita, January 18-19, 1933. In spite of the severe ice storm in that section of the State, the attendance was good. There were 110 veterinarians registered and about 25 or 30 visitors.

Hon. Harry D. Cottman, Mayor of Wichita, gave a rousing address of welcome. Dr. P. B. Darlington, of Chanute, responded in behalf of the Association. President W. R. Barnard gave an address which will go down in the history of the Association as a masterpiece. Dr. Barnard is a practitioner with foresight; he clearly sees the changing times and likewise the changes that must be made in the veterinary profession.

Due to depressed times, a resolution was introduced to omit the initiation fee for this year and admit new members upon the payment of annual dues. It was resolved also to give all delinquent members the advantage of reinstatement upon payment of dues for the present year. These resolutions were unanimously approved.

Dr. R. R. Dykstra, of Manhattan, gave an address entitled "Gleanings of My Term as President of the A. V. M. A." Dr. Dykstra stated that gave him an excellent opportunity to meet with the highest type of scientist the profession offers. Our Association is proud to have had such a distinguished member as Dr. Dykstra available for the presidency of the A. V. M. A.

Dr. John Pugh, of Phillipsburg, read a paper entitled "The Veterinarian and His Community." A similar address was given before one of Dr. Pugh's local civic organizations and it met with great approval from all who heard it. Dr. Pugh stated that a great opportunity awaits every veterinarian to advertise his profession in just such a way as this. The public is eager for the information, it is educational, and a civic organization makes a good medium for disseminating such information.

Dr. Karl F. Meyer, Director of the Hooper Foundation for Medical Research, University of California, gave a very instructive illustrated lecture on "Equine Encephalomyelitis." He called attention to the fact that the disease is transmissible to man. There had been three cases of it in California, one a veterinarian who had been treating this condition in horses. The veterinarian recovered after being treated with immune serum. Dr. Meyer said that Kansas had just enough of this disease during the past year to leave sufficient seed for a large outbreak during the coming season. In view of this prophecy, veterinarians should be on their guard constantly. Dr. Meyer also gave an illustrated discussion on "Psittacosis," which was thoroughly enjoyed by everyone present.

A banquet was held on the evening of the first day of the meeting. Dr. A. T. Kinsley, of Kansas City, acted as toastmaster, and Dr. J. H. Burt, of Manhattan, gave the invocation. The speakers were: Hon. Victor Murdock, Dr. Karl F. Meyer and Dr. R. R. Dykstra.

After a short business session on the morning of the second day, Dr. Kinsley conducted a round-table discussion.

A paper entitled "Canine Practice" was read by Dr. H. G. Stephenson, of Independence, who also demonstrated his technic for spinal anesthesia. Dr. Stephenson uses this form of anesthetic for all operations posterior to the diaphragm. He prefers novocain and ephedrine.

Dr. N. F. Williams, President of the A. V. M. A., talked at some length on the history of the national association and pointed out the value of organizing. Dr. Williams' visit and talk were thoroughly enjoyed by all members, so much so that he was elected to honorary membership.

The final paper on the program was "Deficiency Diseases in Domestic Animals," by Dr. J. G. Hughes, Professor of Chemistry, Kansas State College. Dr. Hughes stated that there was not a school in the United States that offered fundamental courses in food, which seems to be rather startling in view of the great importance of such knowledge.

The following were elected as officers for the coming year: President, Dr. J. F. Thomas, Oswego; vice-president, Dr. J. I. Kirkpatrick, Sedgwick; secretary-treasurer, Dr. Chas. W. Bower, Topeka (reëlected). Dr. S. L. Stewart, of Olathe, was elected to succeed himself as member of the Board of Directors, and Dr. H. C. Gale, of Concordia, will fill an unexpired term on the Board.

Manhattan was the unanimous choice for the next meeting of the Association.

CHAS. W. BOWER, *Secretary.*

NEVADA STATE VETERINARY ASSOCIATION

The annual meeting of the Nevada State Veterinary Association was held January 31, 1933, at the Agricultural Building, University of Nevada, Reno.

The meeting opened with a business session, at which the Association unanimously approved the proposed plan of affiliation of state, provincial and territorial associations with the A. V. M. A., and Nevada became the thirty-fourth state to ratify the plan.

The guest of honor and principal speaker at the meeting was Dr. K. F. Meyer, of San Francisco, Director of the Hooper Foundation for Medical Research, University of California, who spoke on several timely topics. Dr. Edward Records, of the University of Nevada, led the discussion on encephalomyelitis, and a number of case reports were presented.

Following a banquet at Hotel El Cortez, Dr. Meyer showed motion pictures dealing with psittacosis and encephalomyelitis, as well as some shots of winter sports in Switzerland.

WARREN B. EARL, *Secretary.*

DELAWARE VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Delaware Veterinary Medical Association was held at the University of Delaware, Newark, February 3, 1933. The meeting was well attended. In addition to the membership, of which all were present except one, several guests attended. Judging from comments heard at the close of the meeting, the membership felt that this was one of the best and most instructive meetings ever held by the Association. The presiding officers were President H. P. Eves, of Wilmington, and Secretary J. R. West, of Milford.

Of more than usual interest was the very fine lecture delivered by Dr. Morris I. Zurkow, of Dover, upon anaplasmosis. This disease was unknown in Delaware until its presence was discovered by Dr. Zurkow a few years ago. In his first outbreak, in which some seventeen or eighteen cases developed in the herd, Dr. Zurkow was unable to make a positive diagnosis, at first,

and for a time believed he was dealing with anthrax. This mistake in diagnosis was logical, as the first cases died very suddenly and Dr. Zurkow is located in a district where anthrax is very prevalent. Later cases in this herd presented typical clinical symptoms and postmortem lesions of anaplasmosis from which Dr. Zurkow was able to make a correct diagnosis. His diagnosis was confirmed by the University of Delaware and U. S. Bureau of Animal Industry.

Since the initial outbreak, Dr. Zurkow has studied the disease in a number of additional herds. He presented his material in a very clear and interesting manner. His discussion of the differential diagnosis between this disease and anthrax was especially well presented. Although it has not been definitely established, it is believed that anaplasmosis was introduced into the State by importations of wild rabbits from a western state by the State Game Commission, as the disease was unknown in Delaware until after the introduction of the western rabbits. In the treatment of sick animals Dr. Zurkow has not obtained the good results reported by others following the administration of large doses of sodium cacodylate. His best results were obtained by the use of iron cacodylate followed by neoarsphenamine.

A summary of some of the outstanding contributions to our knowledge of Bang's disease was presented by Dr. C. C. Palmer, of the University. This talk was followed by a discussion and demonstration of the agglutination test by Dr. Palmer and Mr. White, of the University. Following the demonstration the members assembled in the bacteriology laboratory, where equipment for conducting the test was set up and where finished tests were ready for final reading. The tests which were ready for reading were arranged in such a manner that each group contained tests showing negative in all dilutions, positive in all dilutions, and others positive up to certain dilutions. Each test was identified by a number and the members were given report sheets and asked to read the unknowns. Everyone took an active interest in reading the tests and when the report sheets were handed in and graded it was found that the majority of the reports were nearly 100 per cent correct. This was an excellent demonstration of the fact which Dr. Palmer emphasized, namely, that veterinarians in practice may very easily conduct the tube test and interpret the results. In demonstrating the technic of running the tube test, the various equipment needed and how it is used was explained by the instructors. On display was an

incubator, of sufficient size for holding 200 tests, made from an ordinary kitchen oil-stove oven, which had proven entirely satisfactory in practice, and which cost when complete about six dollars.

Following the laboratory exercise of conducting the tube test and reading the results, the place of meeting was transferred to the University Farm, where Dr. Louis Levinson gave a demonstration of collecting blood samples from the jugular vein. Dr. C. C. Palmer demonstrated collecting blood from the subcutaneous abdominal vein (anterior mammary).

C. C. PALMER, *Reporter.*

THE VETERINARY ASSOCIATION OF MANITOBA

The forty-sixth annual meeting of The Veterinary Association of Manitoba was held at the Royal Alexandra Hotel, Winnipeg, February 8, 1933. There was a representative gathering of members from all parts of the Province. In the absence of the President, Dr. J. F. Skinner, of Morris, due to illness, the chair was taken by the Vice-President, Dr. F. C. Bishop, of Dauphin.

The following papers were presented:

"Municipal Subsidized Veterinary Service," by Dr. F. C. Bishop, Dauphin.

"Artificial Insemination," by Dr. A. Savage, Animal Pathologist, Manitoba Agricultural College, Manitoba.

"Veterinary Biologics, Their Production and Use," by Dr. J. K. Morrow, Winnipeg.

"Marketing of Beef Cattle," by Dr. R. A. McLoughry, Federal Live Stock Branch, Winnipeg.

"Live Stock Losses from Grasshopper Poison," by Dr. J. A. Munn, Carman.

The report of the Secretary-Treasurer showed a total of 101 registered active members and 13 honorary members, while the financial statement showed a balance on hand of $267.24. The following were elected to serve as officers for the ensuing year: President, Dr. F. C. Bishop, Dauphin; vice-president, Dr. R. H. Lay, Winnipeg; secretary-treasurer, Dr. Wm. Hilton, Winnipeg (reëlected). Council members: Drs. F. C. Bishop, R. H. Lay, Wm. Hilton, O. McGuirk, W. A. Shoults, A. Savage and H. H. Ross. Board of examiners: Drs. A. Savage, H. H. Ross and Wm. Hilton. Auditors: Drs. T. G. Sprague and J. K. Morrow.

WM. HILTON, *Secretary.*

NECROLOGY

WILLIAM ALLEN AXBY

Few veterinarians in the ranks of private practice have rendered better accounts of their stewardship than did Dr. William Allen Axby, whose sudden death on January 20 shocked the profession throughout the land, as well as his hosts of friends in private, civic, business and fraternal circles. The fact that his death was broadcast by radio from a Cincinnati station is, in itself, sufficient evidence of the high place he had made for himself in the community he had served so faithfully and so well for 38 years.

His ability as a public speaker resulted in hundreds of invitations to address farmers institutes, school classes, service clubs, meetings of veterinary associations and other scientific gatherings. He always appeared as a veterinarian, because he loved the veterinary profession and never neglected an opportunity to advance its interests. He was always a student, and his inclination to study, combined with a natural ability to teach, accounted for his frequent appearance on programs of veterinary meetings. As a matter of fact, he had just returned from Des Moines, Iowa, where he addressed the Iowa Veterinary Medical Association, on January 11, when he was laid low by a fatal illness.

Dr. Axby was born on Sawdon Ridge, Miller Township, Dearborn County, Ind., September 22, 1873, the son of Dr. John and Melissa Grubbs Axby. The senior Axby was a veterinarian and the only children, two sons, were destined to become prominent members of their father's chosen profession. The younger son, J. Leonard, has been a bulwark of strength to the profession in Indiana, just as his lamented brother contributed to the high esteem in which the profession is held in Ohio.

At the age of 22, Dr. Axby was graduated from the Ohio Veterinary College, in Cincinnati. He located in Harrison and remained there, and during the 38 years that he practiced in the community his reputation for professional ability and square

dealing spread for many miles in every direction. In the days of the driving horse, his practice was so large that he had to keep six to eight horses and several assistants. From 1897 to 1917, he was a member of the faculty of the Cincinnati Veterinary College, and headed the Department of Surgery. The institution conferred an honorary degree, Doctor of Veterinary Medicine, on Dr. Axby in 1905.

Although his professional work made heavy demands upon his time, Dr. Axby never neglected his duties as a citizen. He served as a member of his local school board and his executive ability won for him election as mayor of Harrison, a post he filled for four years. At the time of his death he was president of the Merchants Bank and Trust Company of West Harrison. He was prominent in Kiwanis circles and had served as president of the Kiwanis Club of Harrison and as Lieutenant Governor of Kiwanis of the Ohio District.

Dr. Axby joined the A. V. M. A. in 1907 and was a frequent attendant at annual conventions. He served one term as a member of the Committee on Intelligence and Education (1927-28) and had been a member of the Committee on Bang's Disease since 1930. In 1928 he was elected a vice-president and this honor was repeated at Atlanta last summer. In the Ohio State Veterinary Medical Association, Dr. Axby was always a conspicuous figure. He served the organization as president (1906-07) and held many important committee assignments from time to time. He also served the Hamilton County Veterinary Association as president (1905-06). He was an honorary member of the Indiana Veterinary Medical Association. He was a member of Harrison Christian Church, a 32nd degree Mason and a member of Hansellman Commandery of Cincinnati. He was an honorary member of Alpha Chapter of Alpha Psi Fraternity.

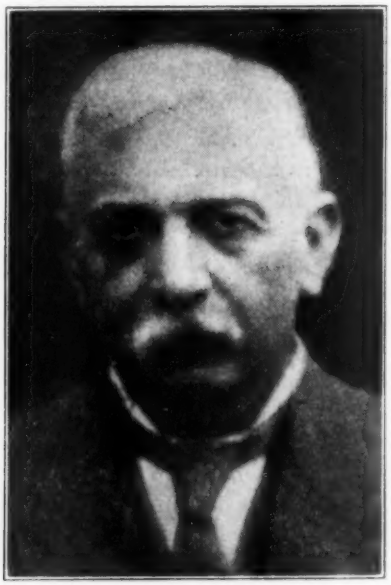
Dr. Axby married Louise Smith, of Chicago, March 22, 1920. She and Dr. J. Leonard Axby are the only immediate survivors. Burial was at Glen Haven Cemetery, Harrison, following services conducted under Masonic ceremonies. The funeral was the largest ever held in Harrison. Many veterinarians from Ohio, Indiana and Kentucky attended, a number of them acting as honorary pallbearers.

A career filled with useful service has been cut short at a time when leaders such as Dr. Axby are sorely needed. Peace be to his ashes.

JOHN C. MEYER

Dr. John C. Meyer, of Cincinnati, Ohio, the oldest member of the A. V. M. A. in years of continuous membership, died January 23, 1933, as announced in the February JOURNAL.

Born at Trenton, N. J., April 9, 1854, Dr. Meyer entered the New York College of Veterinary Surgeons and finished the course before he was twenty years old. Among the archives of the A. V. M. A. is a certificate signed by Dr. John Busteed, President and Medical Director, and bearing the seal of the New York College of Veterinary Surgeons, stating that "Mr. John C. Meyer has passed a satisfactory examination for the degree of



DR. JOHN C. MEYER

Veterinary Surgeon, and will be entitled to his Diploma when he is of age." It is dated February 28, 1874. Dr. Meyer also attended the American Veterinary College, in New York City, and was graduated in 1876. In 1881 he received the degree of M. D. from the Ohio Medical College, now affiliated with Cincinnati University.

Dr. Meyer's early training along veterinary lines was under the guidance and inspiration of his father, who enjoyed the advantage of courses in the veterinary schools located in Zurich

(the elder Meyer was a native of Switzerland), Stuttgart and Vienna, having been graduated from the latter institution in 1846. Undoubtedly this training, in no small measure, accounted for the precocity of the younger Meyer and his completion of the work for the veterinary degree before attaining his majority.

After graduatian Dr. Meyer entered upon his professional career by assisting his father in a large general practice in Cincinnati, later starting out for himself. In 1882 he erected the Cincinnati Veterinary Hospital at 1109-11 Walnut Street, where he conducted a successful practice for 45 years. In 1906 he formed a partnership with Dr. M. W. Tritschler (Amer. '88) and this firm continued its existence until the death of the senior partner.

Dr. Meyer joined the A. V. M. A. in 1875. In 1888 he was elected vice-president. From 1892 to 1894, he served as a member of the Committee on Intelligence and Education and in 1895 he was appointed resident secretary for Ohio. He was a charter member of the Ohio State Veterinary Medical Association and was placed on the Honor Roll in 1908. He served as president for one term (1887-88). He was a member of the Ohio State Board of Veterinary Medical Examiners for a number of years, and served as District Veterinarian to the Ohio Live Stock Commission while this body existed. He was a member of the Cincinnati Chamber of Commerce and had been a member of the Masonic fraternity for many years.

His long membership in the A. V. M. A. and the recent recognition given it proved to be a source of extreme pleasure to Dr. Meyer in his later years. In 1925, upon the completion of a half-century of membership, the Association in convention assembled in Portland, Oregon, sent him the following telegram:

> The American Veterinary Medical Association at their sixty-second annual meeting sends congratulations on this the semi-centennial of your membership and best wishes for the future.

While still in session, the Association received the following reply from Dr. Meyer:

> To the American Veterinary Medical Association. Gentlemen: In reply to your congratulations on my semi-centennial membership in our highly estimable Association wired to me by our worthy Secretary, Dr. Hoskins, I wish to express my sincere gratitude for the manifestation of the good feeling you have displayed in my behalf by your action. I firmly appreciate this rare honor and hope your membership will prove as lasting and beneficial as it has for me. My best wishes for a successful sixty-second annual.

At the meeting in Atlanta, last summer, Dr. Meyer was one of four members to receive medals for having been on the membership roll of the A. V. M. A. for fifty years or longer, through

the thoughtful kindness of the Southern States Veterinary Medical Association. This rare honor was appreciated to the full by Dr. Meyer and the members of his family.

JAMES ALEXANDER WAUGH

Dr. James A. Waugh, of Pittsburgh, Pa., died at the home of his son in that city, February 25, 1933. In his passing the veterinary profession lost one of its most interesting characters. A veteran of the Indian Wars, veterinarian to the Sixth U. S. Cavalry many years ago, teacher and general practitioner, his was a many-sided career. He retired from active practice about three years ago and had passed his 77th birthday, just three weeks before his death.

A graduate of the Ontario Veterinary College, class of 1882, Dr. Waugh first practiced at Allegheny, Pa., removing to Pittsburgh in the early 90's. He joined the A. V. M. A. in 1890 was a member of the Committee on Intelligence and Education, 1891-92; resident secretary for Pennsylvania, 1892-93; and a member of the Committee on Army Legislation, 1893-94. He was a life member of the Pennsylvania State Veterinary Medical Association and served as vice-president for two terms (1894-96). He was a charter member and the first secretary of the Western Pennsylvania Veterinary Medical Association, organized in Pittsburgh, July 24, 1891. About ten years later, on September 13, 1901, to be exact, he helped organize the Allegheny County (Pa.) Veterinary Medical Association and was elected the first secretary.

Dr. Waugh was a prolific letter-writer. His communications always were written in longhand and his characteristic handwriting was very familiar to many veterinarians with whom he kept up correspondence during the later years of his life. His letters were written on whatever happened to be at hand when the spirit moved him. The back of a circular or the blank page of a religious tract served his purpose equally well. It was always a source of regret when he saw or heard of a veterinarian violating the code of ethics, and it appeared to ease his mind if he could give expression to his displeasure whenever anything of the kind came to his notice.

During the past few years Dr. Waugh had given much of his time to collecting veterinary literature. He corresponded with the families of deceased veterinarians and negotiated for the purchase of old books and periodicals. He assembled sets of the leading veterinary journals, both of this country and abroad,

and disposed of them to libraries and veterinary institutions wanting them. He probably had the most complete "want list" of its kind in existence and he had transactions with practically every veterinary library in the world.

Dr. Waugh was an instructor in veterinary science at West Virginia University, Morgantown, from 1904 to 1907, while he practiced in Pittsburgh, giving only a part of his time to his college work. He was well known in Masonic circles and was a member of Chartiers Lodge, No. 294, F. & A. M., of Pittsburgh.

CARL ALBERT BLOMQUIST

Dr. Carl A. Blomquist, formerly of Milaca, Minn., died in the Veterans' Hospital, Fort Snelling, Minn., September 9, 1931. He had been in poor health for some time before entering the hospital.

Born at Omaha, Neb., October 11, 1893, Dr. Blomquist attended grade school and then entered the Kansas City Veterinary College. Following his graduation in 1916, he entered practice at Milaca, Minn. During the World War he was commissioned as a second lieutenant in the Veterinary Corps and was assigned to Company 28, 7th Battalion, stationed at Camp Greenleaf. He was transferred later to the 44th Field Artillery, 15th Division, at Camp Stanley, Tex. He was discharged February 27, 1919.

OWEN E. PELSUE

Dr. Owen E. Pelsue, of Raymore, Mo., died suddenly, December 2, 1932. He was a graduate of the Kansas City Veterinary College, class of 1912. He practiced at Pueblo, Colo., from 1912 until 1924, when he moved to Raymore, Mo.

WILLIAM A. ERBACH

Dr. William A. Erbach, of Athens, Wis., died July 22, 1932. He was born in Wisconsin, December 29, 1896, attended local schools and then entered the University of Wisconsin. He completed two years of work at Madison and then entered Michigan State College, to study veterinary medicine. He received his veterinary degree in 1920.

Although Dr. Erbach never practiced his profession, he always was interested in matters veterinary, and handled all veterinary work in connection with the large herd of pure-bred Guernseys

kept at the Helendale Farms, of which he was manager, and in which he was financially interested, with his father and other heirs of the Fred Rietbrock Estate. It was at Helendale Farms that the notable Guernsey cow Yeksa Sunbeam 15439 was developed. Dr. Erbach also was secretary and treasurer of the Athens Canning Company, packers of quality peas.

MICHAEL F. HENRY

Dr. Michael F. Henry, of North Bergen, N. J., died January 4, 1933, following an illness of two years caused by a heart ailment.

Born at Westboro, Mass., September 25, 1875, Dr. Henry received a classical education before entering the service of the U. S. Bureau of Animal Industry as a tagger, at the Boston, Mass., station on June 20, 1901. He was granted leave of absence, October 1, 1902, to enter the New York-American Veterinary College, from which he was graduated in 1905. On July 5, 1906, he reëntered the Bureau service as a veterinary inspector and was assigned to meat inspection at New York. He served continuously until May 5, 1931, when he was granted a leave of absence on account of ill health. He was finally retired on account of total disability on January 1, 1933.

Dr. Henry joined the A. V. M. A. in 1919. He is survived by one son. Burial was at Westboro, Mass.

JOHN LINDSAY BRADLEY

Dr. John L. Bradley, of Mercersburg, Pa., died at his home, January 6, 1933, after an illness of several months. He was born near Mercersburg, January 25, 1863, and was a graduate of the American Veterinary College, class of 1888. He was engaged in general practice until 1931. For the past year and a half he was with the Farmers Protective Association, of Greencastle, Pa., as field veterinarian.

Dr. Bradley was an active member of the Cumberland Valley Veterinary Association. He is survived by one daughter and one brother.

MAURICE E. J. EVANS

Dr. Maurice E. J. Evans died at his home in Manlius, N. Y., January 19, 1933. He was a graduate of the New York State Veterinary College at Cornell University, class of 1910. He served for 22 months in France as first lieutenant in the Vet-

erinary Corps during the World War. For the past 12 years he had been a veterinary inspector for the State Department of Farms and Markets. He was a member of the New York State Veterinary Medical Society, the American Legion, the Elks and the Knights of Columbus.

J. G. W.

JESSE A. VILES

Dr. Jesse A. Viles, of Lowell, Mass., died January 21, 1933, after a brief illness. He was in his 82nd year. Dr. Viles was a registered non-graduate practitioner and conducted a general practice in Lowell for over 50 years. He retired about five years ago.

CLINTON W. POWER

Dr. Clinton W. Power, of Attica, Ind., died at his home, February 7, 1933, following a stroke of apoplexy. Although he had been in poor health for several months, he had been able to be at his office every day.

Born near Carmel, Ind., October 27, 1883, he attended the Indiana Veterinary College. Following his graduation in 1911, he located at Attica and enjoyed a very successful practice there. He was interested in the Attica Live Stock Company until a short time before his death.

Dr. Power joined the A. V. M. A. in 1912. He was active in the Attica Fish and Game Protective Association and served as its president last year. The deceased is survived by his widow, two sisters and one brother.

RUDOLPH KJERNER

Dr. Rudolph Kjerner, of Chatfield, Minn., died suddenly at his home, February 10, 1933, as a result of cardiac disease.

Born in Rochester, Minn., November 1, 1870, Dr. Kjerner attended local schools, took a course in a business college and then entered the Ontario Veterinary College. Following his graduation in 1896, he returned to Chatfield to enter general practice and remained there until his death.

Dr. Kjerner joined the A. V. M. A. in 1911. He was a member of the Minnesota Veterinary Medical Society and the Tri-County Veterinary Association. He is survived by his widow, two daughters, his mother, two brothers and two sisters.

H. C. H. K.

ALFRED STEPHEN BURDICK

Dr. Alfred S. Burdick, president of Abbott Laboratories, North Chicago, Ill., died of pneumonia at the Highland Park (Ill.) Hospital, February 11, 1933, at the age of 65.

A nationally known figure in the fields of medicine and chemistry, his connection with the Abbott Laboratories dated from 1921, when he was elected vice-president of the company.

Dr. Burdick was a graduate of Rush Medical College, class of 1891, and practiced in Florida and Illinois for a number of years. From 1899 to 1904 he was associate professor of medicine at the Illinois Medical College. During the World War he was a member of the Selective Service Board No. 59. In 1923, he was commissioned as lieutenant colonel in the Medical Reserve Corps. He was a former president of the American Drug Manufacturers Association.

E. E. S.

WILLIAM J. MALONE

Dr. William J. Malone, of Mount Horeb, Wis., died in his car at Merkel, Tex., February 10, 1933, while returning home from California, where he had been visiting since November. Dr. Malone was a graduate of the Chicago Veterinary College, class of 1896, and was a member of the A. V. M. A. from 1912 until 1919, when he resigned. His widow survives.

GEORGE S. KERR

Dr. George S. Kerr, of Washington, Iowa, died at his home, February 12, 1933, after a serious illness.

Born at Fullerton, Canada, March 8, 1863, Dr. Kerr was graduated from the Ontario Veterinary College in 1890 and entered practice at Washington in March, 1891.

Dr. Kerr was a member of the Eastern Iowa Veterinary Association and the Washington County (Iowa) Veterinary Association. He was a distinguished member of all Masonic bodies in Washington. He is survived by his widow and two daughters.

L. W. K.

GEORGE GUSTAV EMIL VASELIUS

Dr. George G. E. Vaselius, of Horseheads, N. Y., died at the Arnot-Ogden Hospital, Elmira, N. Y., February 17, 1933, follow-

ing injuries received in an automobile accident two days previously.

Born in Helsingfors, Finland, May 23, 1886, Dr. Vaselius received his early education in that country and Germany. He was a graduate of the Finnish Agricultural College of Helsingfors, and his veterinary training was secured at the New York State Veterinary College at Cornell University. He was graduated in 1923 and located at Spencer, N. Y. He removed to Horseheads in 1927 and was Chemung County Veterinarian at the time of his death.

Dr. Vaselius joined the A. V. M. A. in 1925. He was a member of the Elmira Lodge, B. P. O. E. 62. He is survived by a daughter, his mother and five sisters.

FRANK H. McCARTHY

Dr. Frank H. McCarthy, of Pottsville, Pa., died at the Good Samaritan Hospital, Pottsville, February 17, 1933, in his 60th year. His death resulted from a fall on the ice, several days previously, causing a severe concussion of the brain.

Born at Saint Clair, Pa., Dr. McCarthy attended local grade and high schools. He received his veterinary education at the Ontario Veterinary College. Following his graduation in 1892, Dr. McCarthy located at Ashland, Pa., and practiced there until the death of Dr. J. W. Sallade, in 1921, when he removed to Pottsville to take over the practice of Dr. Sallade. For more than 30 years he was veterinarian to the Philadelphia and Reading Coal and Iron Company.

Dr. McCarthy joined the A. V. M. A. in 1911. He was a member of the Pennsylvania State Veterinary Medical Association and served as president for the year 1917-18. He was actively identified with the Schuylkill Valley (Pa.) Veterinary Medical Association for many years, and served as president for term 1903-04. He was a member of the Pennsylvania State Board of Veterinary Medical Examiners (1921-31).

Since the organization of the Schuylkill County Fair Association, Dr. McCarthy had been a member of the Board of Directors and the Executive Committee, and was the director in charge of the speedway. He was a member of the Pottsville Commercial Club, Knights of Columbus, No. 431, and the Holy Name Society. He was a past exalted ruler of the Elks.

Surviving Dr. McCarthy are his widow (neé Anna Sallade), three brothers and one sister.

E. D. SNYDER

Dr. E. D. Snyder, of Wellington, Ohio, died at his home, February 18, 1933, following a stroke several days before. He was 65 years of age. He was a native of North Fairfield, Ohio, and a graduate of the Grand Rapids Veterinary College, class of 1906.

Dr. Snyder spent his entire professional career at Wellington. For many years he was a director of the Wellington Fair Association, and for more than twenty years was Superintendent of Speed at the Wellington Fair. For two years he was a director of the Lorain County Fair. He was a member of the Royal Arcanum of the Fraternal Order of Eagles. His widow and one daughter survive.

THOMAS W. WATSON

Dr. Thomas W. Watson, of Corsicana, Tex., died in the Corsicana Hospital, February 23, 1933, after an illness of only two days. He was 76 years of age.

A native of Canada, Dr. Watson was graduated from the Ontario Veterinary College in 1887. He located at Marshalltown, Iowa, and removed to Tyler, Tex., in 1902, after taking a special graduate course at the Kansas City Veterinary College. In 1906, he removed to Corsicana and became very prominent in that community. He held certificate No. 1 from the Texas State Board of Veterinary Medical Examiners.

Dr. Watson joined the A. V. M. A. in 1915. He was an elder of the First Presbyterian Church at the time of his death. In Masonic circles he had been very active for 35 years and had presided over all local branches of the order. Surviving are two daughters, two sons, two sisters and a brother.

F. D. P.

EDWARD M. LANG

Dr. Edward M. Lang, of Louisville, Ky., was found dead in his office, February 25, 1933. He had been dead about an hour when found. A heart attack was the cause of death. Dr. Lang was 55 years old and was a graduate of the Chicago Veterinary College, class of 1906. He had been in general practice in

Louisville ever since his graduation. Surviving him are his widow, one daughter, one son and four brothers.

IRA DILLEY

Dr. Ira Dilley, of Roseville, Ill., died at his home, February 27, 1933, after an illness of two weeks. Death was due to arteriosclerosis.

Born September 16, 1855, near Roseville, Dr. Dilley attended local schools and the Chicago Veterinary College. Following his graduation in 1890, he located at Roseville and spent his entire life there with the exception of eight years which he spent at Monmouth, Ill., as deputy sheriff (1902-06) and sheriff (1906-10) of Warren County. He served Roseville Township as assessor for 14 years, a position he held at the time of his death. He was also Republican committeeman of the Township, and had served as Republican county chairman for many years.

Dr. Dilley was an Odd Fellow and an Elk. He is survived by his widow (née Alice Jared) and two brothers.

HERBERT LAWRENCE BLACKBURN

Dr. Herbert L. Blackburn, of Fort Worth, Tex., died at his home, February 27, 1933, after an illness of several weeks.

Born at Covington, Ky., September 27, 1889, Dr. Blackburn attended local schools and the Cincinnati Veterinary College. He was graduated in 1912 and engaged in general practice at Covington, until he entered military service during the World War. He commanded the Veterinary Hospital Section of the 19th Division and participated in several major engagements, including the Battle of the Argonne. He served six months in the Army of Occupation, after the Armistice, and was discharged at Camp Bowie, Tex., in August, 1919. Dr. Blackburn entered practice in Fort Worth and conducted the Blue Cross Dog and Cat Hospital. He held a commission as lieutenant colonel in the Veterinary Reserve Corps.

Dr. Blackburn joined the A. V. M. A. in 1929. He was a member of the State Veterinary Medical Association of Texas and served that body as president for the year 1924-25. He was a past president of the Dallas-Forth Worth Veterinary Medical Society, and of the Reserve Officers Association. He was past commander of the Camp Bowie Post No. 708, Veterans of For-

eign Wars, a member of the Lions Club, Glen Garden Country Club, Elks Club, and American Legion.

Surviving Dr. Blackburn are his widow, three brothers and two sisters. The body was taken to Covington, Ky., his former home, for burial.

F. D. P.

FONSA ALLAN LAMBERT

Dr. F. A. Lambert, of Columbus, Ohio, died in a local hospital, March 22, 1933, as a result of a bullet wound accidentally inflicted by his son.

Born at Kenton, Ohio, in 1887, Dr. Lambert attended local grade and high schools, and then entered Oberlin College. He spent one year there and then transferred to Ohio State University, to study veterinary medicine. Following his graduation in 1910, Dr. Lambert accepted a position as assistant professor of veterinary anatomy in the College of Veterinary Medicine, under the late Dr. Septimus Sisson. He remained at Ohio State University until 1919, when he resigned to go into military service. He was commissioned in the Veterinary Corps, as a captain, and was stationed at Camp Greenleaf, Georgia, as a member of the instruction staff. In 1922 he helped to organize the Columbus Serum Company and was secretary-treasurer at the time of his death.

Dr. Lambert joined the A.V.M.A. in 1916. He served as resident secretary for Ohio (1919-21 and 1928-29), as a member (1920-22) and as chairman (1922-23) of the Committee on Legislation, and as a member of the Committee on Resolutions (1927-28). He was a member of the Ohio State Veterinary Medical Association and served as secretary from 1915 until 1918 and for the term 1921-22. He also served as secretary of the Northwestern Ohio Veterinary Medical Association from 1925 until 1931. He was a member of Alpha Psi and Sigma Alpha Epsilon fraternities.

Dr. Lambert was recognized as an outstanding authority on football rules, and was a member of the Advisory Council of the National Football Rules Committee. He is the author of two well-known books on the subject of football and he frequently acted as an official at college football games played in the Middle West.

Surviving Dr. Lambert are his widow, one son and one daughter. Burial was at Kenton, Ohio.

MARRIAGES

DR. G. B. BRADSHAW (A. P. I. '19), of Nashville, Tenn., to Miss Fay Calloway, of Jasper, Ala., October 15, 1932, at Birmingham, Ala.

DR. B. C. ORNBAUN (Ind. '08) to Miss Lena Arnold, both of Petersburg, Ind., January 15, 1933, at Petersburg, Ind.

BIRTHS

To DR. and MRS. JESSE SAMPSON, of Ithaca, N. Y., a son, Richard Eugene, January 20, 1933.

To DR. and MRS. B. J. ERRINGTON, of Ithaca, N. Y., a daughter, Lucinda Nan, January 23, 1933.

To DR. and MRS. E. V. MOORE, of Cortland, N. Y., a son, Veranus Allen, February 17, 1933.

PERSONALS

DR. A. E. HANCOCK (O. S. U. '31) is now located at Williamsport, Ohio.

DR. E. A. LAIRD (Iowa '22) has removed from Taylorville, Ill., to Auburn, Ill.

DR. R. M. PRITCHARD (Wash. '30) has removed from Santa Cruz, Calif., to Tacoma, Wash.

DR. W. C. GILLER (Ont. '01-Chi. '02) resumed general practice at Roodhouse, Ill., on March 1.

DR. W. L. BOLIN (St. Jos. '18-Ont. '21) has removed from Barron, Wis., to Turtle Lake, Wis.

DR. G. A. BOYD (Colo. '20) has changed locations from Arcata, Calif., to Crescent City, Calif.

DR. FRANK T. HARRIS (Wash. '28), formerly of Twin Falls, Idaho, is now located at Merced, Calif.

DR. G. R. BOOTH (Ont. '24), formerly located at Russell, Ontario, is now at Gananoque, Ontario, Can.

DR. L. F. VAUGHN (K. C. V. C. '16), formerly located at San Jose, Calif., is now at Elks Grove, Calif.

DR. RAY KELLY (K. C. V. C. '11) changed locations March 1 from Clinton, Mo., to Knob Noster, Mo.

DR. WILLLAM F. SIMS (A. P. I. '32) has located at Newport, Tenn. His office address is 314 W. Church St.

DR. F. H. KELLY (U. P. '18), who removed to Los Angeles, Calif., last year, has returned to Goldfield, Iowa.

DR. E. F. SHEFFIELD (O. S. U. '22) opened a new veterinary hospital at 1890 W. Atlantic Blvd., San Diego, Calif.

DR. W. E. MERRILL (U. P. '29) has removed from Wilmington, Mass., to Lowell, Mass. Address: 18 Holbrook Ave.

DR. JAMES MORRIS (Iowa '21) has requested a change of address from Onawa, Iowa, to 408 Burns St., Ida Grove, Iowa.

DR. G. P. MAYER (Chi. '16) has requested a change of address from Elk Rapids, Mich., to 119 S. Fairview Ave., Lansing, Mich.

DR. LEO M. STECKEL (O. S. U. '07), of New York City, who has been traveling for over a year, was last heard from at Honolulu, Hawaii.

DR. JOHN W. CALDWELL (San Fran. '15), formerly located at Hemet, Calif., recently removed to Riverside, Calif. Address: 6886 Magnolia Ave.

DR. E. W. NEWHALFEN (McK. '18), who has been located in Clinton, Iowa, the past year, has returned to Tiskilwa, Ill., to resume practice there.

DR. J. A. WINKLER (Cin. '18), of Fort Thomas, Ky., addressed the Covington (Ky.) Rotary Club on "Dogs," at a regular weekly luncheon meeting recently.

DR. C. W. WARD (Gr. Rap. '17), formerly of Stockbridge, Mich., opened the Redford Dog and Cat Hospital, at 17542 Lahser Avenue, Detroit, Mich., in February.

DR. F. G. ROTH (Ind. '17), of Crown Point, Ind., was reappointed Lake County Veterinarian for another year, by the County Commissioners, the latter part of January.

DR. HOWARD T. CORBET (Ind. '18), who is with the Corn States Serum Company, has been transferred from Omaha, Nebr., to Des Moines, Iowa. Address: 722 E. Sixth St.

DR. DANIEL DECAMP (K. S. C. '29), of the Bureau of Agricultural Economics, has been transferred from Oregon, Mo., to Jersey City, N. J., on poultry inspection.

DR. W. F. BROWNLEE (Chi. '94), of Kirkwood, Ill., is equipping a hospital for small animals and will have Dr. W. C. Scotten (Chi. '16), recently of Kansas City, Mo., associated with him.

DR. J. H. BROWN (K. C. V. C. '14), formerly located at Rich Square, N. D., has removed to Tarboro, N. C., where he has taken over the practice of the late Dr. O. H. Graham (O. S. U. '14).

DR. C. D. BARRETT (O. S. U. '23), of Akron, Ohio, addressed a meeting of dog lovers at Kent State College, Ravenna, Ohio, February 11. Dr. Barrett spoke on some of his experiences with dogs.

DR. LYNN C. PALMER (Mich. '20), of Kalamazoo, Mich., is secretary of the Southwestern Michigan Kennel Club. His hospital was given a write-up in the February issue of *I. K. C. Doggy Topics and Pet Review*.

DR. R. E. LUBBEHUSEN (O. S. U. '18) has resigned his position in the laboratories of the Pennsylvania Bureau of Animal Industry, at Harrisburg, to accept a position at the University of California, Berkeley.

DR. L. A. RUFF (Gr. Rap. '11), of Marshall, Mich., was called to render first aid to three horses that went through the ice and narrowly escaped drowning in the Kalamazoo River, near Marshall, the latter part of February.

DR. NEIL H. MYERS (O. S. U. '25), of Wilmington, Ohio, received considerable newspaper publicity recently, when he performed a successful cesarean operation on a Shropshire ewe and delivered three lambs, all alive and hearty.

DR. C. L. CAMPBELL (O. S. U. '26), formerly executive secretary of the Iowa Veterinary Medical Association, has removed from Des Moines, Iowa, to East St. Louis, Ill., where he is now connected with the Corn Belt Serum Company.

DR. L. G. HART (K. C. V. C. '18), of Chippewa Falls, Wis., has been appointed a member of the Wisconsin State Board of Veterinary Medical Examiners by Governor Schmedeman, upon recommendation of the Wisconsin State Veterinary Medical Association.

DR. J. F. DEVINE (Amer. '98), of Goshen, N. Y., accompaned by Mrs. DeVine, left their home on February 22 for a cruise of the West Indies. They expected to visit Havana, Kingston and Nassau, besides spending a couple of days in Miami, the entire trip to cover a couple of weeks.